TANTA UNIVERSITY

Electrical Power and Machines
Engineering Department

Faculty of Engineering

Final EXAM 2015/2016 - First Term

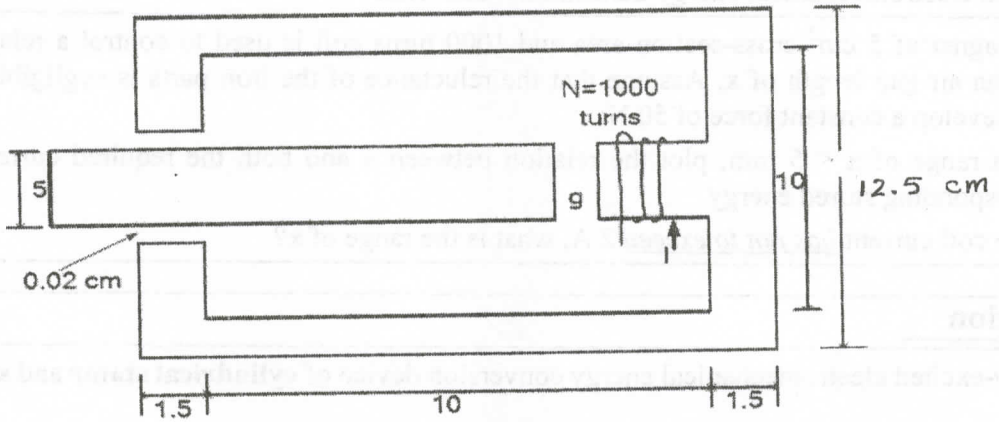
Course	Energy Conversion (EPM2106)	Time Allowed	3 hours
Students	2nd Year (Electrical Power and Machines)	Total Mark	90
Date	13/1/ 2016	Number of pages	2

Attempt ALL the following questions and problems:

- *Clarify your answer with the suitable sketches as you can.*
- *Assume any missed data reasonably.*

The First question

1. The device shown in the figure is a practical form of magnet. It is cylindrical about a horizontal axis. The coil current carries a constant of 3.0 A. if the mmf in the iron is neglected.
   a- Compute the flux densities, in tesla, between the working faces of the center core and the plunger for gaps g = 0.25, and 0.5 cm.
   b- Compute the corresponding values of the coil inductance at two air gaps.
   c- If the current increased from 3 A to 6 A compute the corresponding values of the coil inductance at two air gaps.



2. For a magnetic circuit that contains of a part of permanent magnet material and an air-gap, show how the magnet and air-gap dimensions affect the operating point.

The Second question

1. A 3-phase 16-pole, star connected, alternator has 192 slots with 8 conductors per slot and the conductors of each phase are connected in series. The coil span is 150^0 electrical. Find the phase and line induced emfs, if the flux per pole is 64 mWb sinusoidally distributed and the machine runs at 375 r/min.
2. Explain the dot convention employed to determine the polarity of the mutually induced voltages. Then show how it can be determined experimentally.
3. Both analytically and graphically, show that balanced three-phase windings excited by balanced three-phase currents produce a single rotating MMF wave.

Please Turn Over

The Third question	
1.	Determine the main dimensions, number of stator slots, number of turns per phase, and conductor cross section area of a 50 hp, 380 volt, 1450 r/min, 50 Hz, 3-phase induction motor star connected. Assume Specific magnetic loading = 0.5 tesla, specific electric loading =30000 A/m, efficiency = 0.9 and power factor = 0.9. Winding factor = 0.955, current density = 3.5 A/mm^2 and the ratio of core length to pole pitch is 1.25.
2.	Using suitable clarifications of sufficient data, show the following: a) Solar cell characteristics b) Wind turbine characteristics c) Components of a photovoltaic generating system. d) A wind-energy-based generating system.

The Fourth question	
1.	With the aid of suitable mathematical relations, define what is meant by transformer and rotational induced voltages. Then show *with explanation* what is the type of voltages induced in a) The secondary of a transformer. b) The stator of a synchronous machine. c) The rotor of an induction motor.
2.	Define **co-energy**. Then **derive** in details how it can be used to obtain **the force** developed in a singly-excited electromechanical energy translational converter
3.	An electromagnet of 5 cm^2 cross-section area and 1000 turns coil is used to control a relay. The magnet has an air gap length of x. Assume that the reluctance of the iron parts is negligible. It is required to develop a constant force of 50 N: a) For a range of x < 5 mm, plot the relation between x and both the required current and corresponding stored energy b) If the coil current *has not to exceed* 2 A, what is the range of x?

The Fifth question	
1.	For a doubly-excited electromechanical energy conversion device of **cylindrical stator** and **salient-pole rotor**: a) Sketch the space variation of self and mutual inductances. b) Derive a general expression for the electromagnetic torque acting on the rotor. c) Show all the possible electrical machines can be obtained. d) For zero rotor current, show how to obtain the energy converted into mechanical form when moved from a position to another. In your answer: i. *Derive* ALL necessary relations. ii. *Define* the two positions for maximum mechanical energy.
2	A two-pole rotating electromechanical energy conversion device with double saliency is singly-exited via stator. The maximum and minimum stator winding self-inductances are 2 and 1 H respectively. The excitation current is sinusoidal of 50 Hz and 10 A (rms). Determine: a) Rotor speed that achieves non-zero average torque. b) An expression for average torque. c) The condition for maximum average torque.

Good Luck and best wishes *Prof. Essam Eddin M. Rashad and Dr. Abdelwahab Hassan*

Tanta University | Department of Physics&Mathematics | Faculty of Engineering

Course Title: Numerical analysis | Year: 2nd Elec. Power | PME2109
Date: (First term)2016 | Allowed time: 3 hrs | No. of Pages: (2)

Q (1) (25M)

(a) Use Lagrange polynomial to find one root of $\cosh x + x - 3 = 0$

(b) Deduce the form of Newton's divided difference low where

$F[x_{i+1}, x_i] = \frac{y_{i+1} - y_i}{x_{i+1} - x_i}$ and $F[x_{i+2}, x_{i+1}, x_i] = \frac{F[x_{i+2}, x_{i+1}] - F[x_{i+1}, x_i]}{x_{i+2} - x_i}$

(c) From the following table find

x	0	0.5	1	1.5	2	2.5	3
f(x)	2	2.7	3.1	5.2	7.2	9	11

(i) Find f(0.21), f(1. 1) and f(2. 55)
(using Newton's and Stirlling methods)

(ii) $D_{2,2}$ (Ricardson extrapolation) where $D_{1,1}$ =f '(1) .

(iii) f '(0) , f '(0.1) , f '(3) and f ''(1)

Q (2) (25M)

(a) Deduce the recurrence form of Romberg algorithm

$$R_{n,m+1} = \frac{4^m}{4^m - 1} R_{n,m} - \frac{1}{4^m - 1} R_{n-1,m}$$

(b)Find an approximate value of $\int_0^2 e^{x^2} dx$ **by using**

(i) Trapezoidal rule
(ii) Simpson rule
(iii) weddle method
(iv) Find $R_{2,2}$ (Romberg extrapolation)
(v) Gauss three-pionts

Q (3) (25M)

(a) Deduce the truncation error form of Euler method for solving

$y' = f(x, y)$, $y(x_0) = y_0$, $\left|\frac{\partial f}{\partial y}\right| \le M$, $\left|\frac{d^2y}{dx^2}\right| \le K$ **and use this form to find the**

truncation error for $y' = y + e^x$, $y(0) = 1$ **with exact solution** $y = e^x + xe^x$ **and h=0.2**

(b) **Tank T_3 contains initially 200 gal of water in which 160 lb of salt are dissolved. Tank T_1 contains initially 100 gal of pure water. T_2 contains initially 100 gal of pure water . Liquid is pumped through the system as indicated, and the mixtures are kept uniform by stirring. Find the amounts of salt $y_1(t)$, $y_2(t)$ and $y_3(t)$ in T_1, T_2 and T_3 ,respectively at $t = 0.6$ use $h=0.2$.**

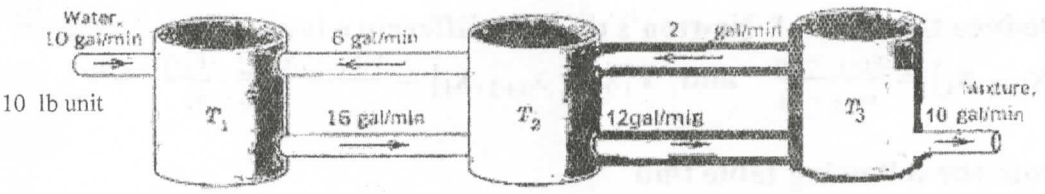


Fig. Tanks in Problem

Q (4) (25M

(a)

Let δ , ∇, Δ and D be forward .backward, center and derivative operators. Show that

(i) $D = \frac{2}{h} sinh^{-1}(\frac{\delta}{2})$

(ii) $\delta^n f_{i+\frac{n}{2}} = \nabla^n f_{i+n} = \Delta^n f_i$

(b) **Use finite difference method to find the solution of Laplace equation $u_{xx} + u_{yy} = 0$, with boundary conditions u(x,0)=x(1-x) , u(0,t)=1, u(1,t)=0 and u(x,1)=x(1-x)**

(c) Use Newtons backword formula to derive Adams-Bashfourth four-step Method then use it to find y(0.6) , h=0.2 for

$$y' = \sqrt{2x + y} \text{ where } y(0) = 2$$

TANTA UNIVERSITY
FACULTY of ENGINEERING
DEPARTMENT OF ELECTRICAL POWER AND MACHINES ENGINEERING
EXAMINATION (SECOND YEAR) STUDENTS OF ELECTRICAL ENGINEERING

COURSE TITLE: ELECTRICAL POWER ENGINEERING (1)			COURSE CODE: EPM2105
DATE: 16/1/2016	TERM: FIRST	TOTAL ASSESSMENT MARKS: 90	TIME ALLOWED: 3 HOURS

Q1: (28 Marks)

A. Write short notes on the following:

i. Skin effect
ii. Transposition of conductors
iii. Balancer machines set (6 Marks)

B. A 50-Hz double-circuit 3-phase line is arranged as shown in Figure 1. The conductors are completely transposed and are of radius 1 cm each. Find,

- **The inductance per phase per km and the corresponding inductive reactance.**
- **The capacitance per phase per km and the charging current at 138 kV. (12 Marks)**

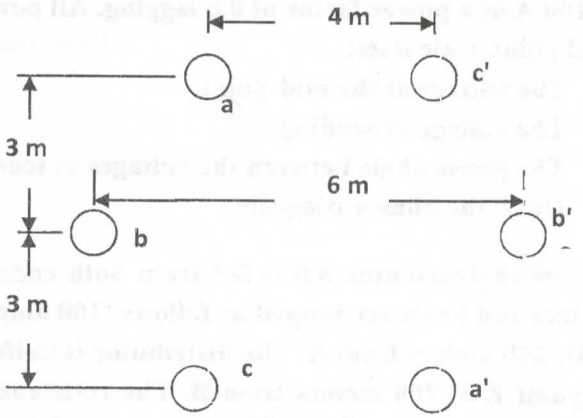


Figure 1

C. A three-phase, 50 Hz transmission line has the following parameters per phase: resistance = 12 Ω, inductance = 63.66 mH and capacitance = 1.06 μF. Using the nominal T-method, calculate:-

- **ABCD constants of the line.**
- **Sending end voltage, current, power, and power factor.**
- **Transmission line efficiency and voltage regulation.**
- **Draw the complete phasor diagram.**

The line supplies a balanced load of 50 MW at 132 kV and a power factor of 0.8 lagging.

(10 Marks)

Q2: (20 Marks)

A. Compare the volume of conductor material required in 3-phase 4-wire system and 3-wire d.c. system assuming that:

i. The amount of power P transmitted is the same
ii. The voltage V at the consumer's terminals is the same
iii. The efficiency of transmission is the same
iv. The area of X-section of neutral wire is the same of the outers. (5 Marks)

B. Mention the different methods used to improve the voltage distribution over string insulators in overhead transmission lines. Which method is practically used? (5 Marks)

C. A string insulator has 4 units and each unit has a safe working voltage of 15 kV. Find the maximum line voltage on which it can be operated safely and find the string efficiency. The ratio of self-capacitance to shunt capacitance of each unit is 8:1. Derive any expression used.

(10 Marks)

Q3: **(22 Marks)**

A. Derive an expression for the total power losses and the minimum voltage in a uniformly loaded distributor fed at both ends with equal voltages. **(6 Marks)**

B. A single phase AC distributing feeder 1 km long has a total per conductor resistance and reactance of 0.1 and 0.15 ohm, respectively. At the far end, the voltage is 200 Volt and the current is 100 A at a power factor of 0.8 leading. At the mid-point, there is a load with a current of 100 A at a power factor of 0.6 lagging. All power factors are with reference to the voltage at load point. Calculate:

i. **The voltage at the mid-point**
ii. **The voltage at sending end**
iii. **The phase angle between the voltages at sending end and far end point**
iv. **Draw the phasor diagram** **(8 Marks)**

C. Two-wire distributor AB is fed from both ends at 250 volt. The total length of feeder is 500 meters and loads are tapped as follows: 100 amperes at C; 100 meters from A and 80 amperes at D; 250 meters from A. The distributor is uniformly loaded at 2 A/meter length from point B to point E at 200 meters from B. The resistance (go and return) per 1000 meters is 1 Ohm. Calculate the current in various sections of the feeder, the minimum voltage and the point at which it occurs in the system. Draw the load current, voltage profile and voltage drop diagrams. **(8 Marks)**

Q4: **(20 Marks)**

A. State the electrical and mechanical considerations for transmission line design. **(4 Marks)**

B. Fill in the blanks by inserting appropriate words

i. **If sag in overhead line increases, tension in the line .....**
ii. **A ring main distributor fed at one end is equivalent to ..... fed at both ends with equal voltages.**
iii. **The balancer machine connected to the heavily loaded side works as a .....**
iv. **If the power factor of load decreases, the line losses .....**
v. **A shorter string has .....string efficiency than a longer one.**
vi. **The longer the cross arm, the .....the string efficiency.**
vii. **If the spacing between the conductors is increased, the capacitance of the line is.....**

(7 Marks)

C. Two towers having height of 50 meters and 80 meters support a transmission line at a river crossing. The transmission line has a span of 600 meters between the supports. The weight of the conductor is 2 kg/m length, area of cross-section is 2.5 square cm and the breaking stress is 4200 kg/ square cm. Assuming that the ice weight is 0.5 kg/m length, find the minimum clearance level and the clearance at mid-way between the supports. The safety factor is 4. Bases of the towers can be considered the water level. **(9 Marks)**

Good Luck

Course Examination Committee: **Prof. Ahmed Refaat**
Dr. Doaa Mokhtar
Dr. Hossam A. Abd el-Ghany

Tanta University		Department: Electrical Power and Machine Engineering		Faculty of Engineering
Course Title: Mechanical Engineering			Course Code: MEP 2141	Years: 2th
Date: January, 20 – 1 - 2016		Allowed time: 3 hrs	Full Marks: 70	No of Pages: 2
Name: Prof. Dr. Abd-Elnaby E. Kabeel				Final Exam

Answer the following questions: Assume any necessary assumptions. **Marks**

Question No. 1 (15)

a) Define and explain with drawing:

- Surface tension and capillarity.
- Bulk modulus of elasticity of fluid.

b) A 600 MW power plant burns coal 78.6 % C, 5.6 % H_2, 9.3 % O2, 1.3 % N_2, and 5.2 % S_2. The coal has average moisture and ash fractions of 14 and 11 percent, respectively. This plant operates with thermal efficiency 38.5 %. An analysis of coal gives a higher heating value of 33160 kJ/kg. an orsat analysis of flue gas gives 13.78 % CO_2, 4.49 % O_2 and 0.75 % CO and refuse coal is 0.1195 kg/kg_f.

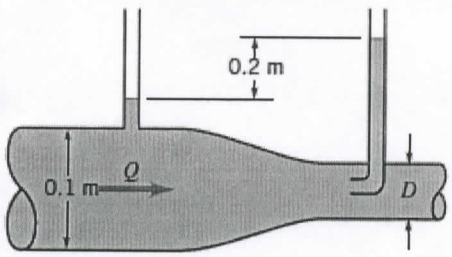
Find:

1) The coal rate.
2) The capacity of forced draught fan, in kg/s if the atmosphere conditions are 50 °C, 0.942 bar, and relative humidity of 50 %.
3) The capacity of induced fan in kg/s, if the exhaust gas is at 288 °C and 0.891 bar.
4) The size of the motors required to driving the f-d and i-d fans in hp, if there is a 63 cm water difference across each unit and mechanical efficiency of each fan 89 %.

Question No. 2 (12)

a) Draw and classify all pressure measuring devices.

b) Water flows through the pipe contraction shown in Fig. For the given 0.2-m difference in the manometer level, determine the flow rate as a function of the diameter of the small pipe, D.

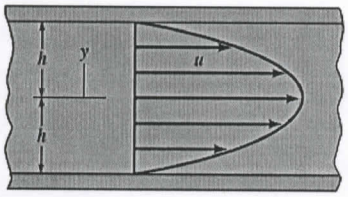


Question No. 3 (13)

a. An R-22 refrigeration system works between pressure limits 1.4 bar and 9.6 bar respectively. The refrigerant vapor leaves the evaporator in the saturated vapor state. The condensate leaves the condenser in just saturated liquid state. Find COP of the system.

b. The velocity distribution for the flow of a Newtonian fluid between two wide, parallel plates is given by the equation

$$u = \frac{3V}{2}\left[1 - \left(\frac{y}{h}\right)^2\right]$$



Where V is the mean velocity. The fluid has a viscosity of 0.04 Pa. s. When V= 2 m/s and h = 0.1 m determine: (a) the shearing stress acting on the bottom wall, and (b) the shearing stress acting on a plane parallel to the walls and passing through the centerline (midplane).

Question No. 4 (10)

A centrifugal pump deliver 0.2 m^3/s discharge of the water from suction reservoir in to delivery reservoir. The static suction head 5 m blow the atmospheric pressure and static delivery head 18 m above the atmospheric pressure. Diameter of suction and delivery pipe is 20 cm and length of suction pipe 5.5 m and length of delivery pipe is 20 m. the friction factor of pipe material 0.04 m. Determine the shaft power input to the pump. Given pump efficiency 0.86.

Question No. 5 (10)

Find the critical radius of insulation for the pipe with the outer diameter 7 cm surrounded by asbestos K = 0.181 W/m °C and exposed to air at a temperature of 10 °C with h = 3.5 W/m^2 °C. Also, find the heat losses from the pipe at 275 °C for the following cases:

- Pipe with the critical radius of insulation.
- Pipe without insulation.
- Pipe with the critical radius of insulation + 1.5 cm thick insulation.
- Pipe with the critical radius of insulation – 1.5 cm thick insulation.

Question No. 6 (10)

The clearance volume of an air compressor is 6% of the stroke volume. The pressure and temperature of the air during the suction stroke is 0.965 bar and 32°C respectively, and delivery pressure is 6.2 bar. The compressor has a bore of 120 mm a stroke of 152 mm. The compression and re-expansion curves follow the law PV1.25 = constant, and the atmosphere air conditions are 1.013 bar and 15.5 °C. Determine

- The volumetric efficiency
- The work done per kg of air.

***Good luck. Prof. Dr. Abd-Elnaby E. Kabeel**

Tanta University
Faculty of Engineering
Electrical Power and Machines Engineering Dept.

Final Exam – First Semester 2015-2016

Course: EPM2104/EPM2141(Electromagnetic Fields)	**Time allowed:** 3 hr
Year: 2nd Electrical Power/Communications	**Date:** 27/1/2016
No. of Pages: 4	**Total Score:** 85

Remarks: Attempt to solve all of the following questions

Question 1 — **10 Points**

Choose the correct answer for the following statements: **(Verification of your choice is A MUST when numerical data are given)**

(1) Plane $z = 10$ m carries charge 20 nC/m^2. The electric field intensity at the origin is

(a) $-10a_z$ V/m (b) $-18\pi a_z$ V/m (c) $-72\pi a_z$ V/m (d) $-360\pi a_z$ V/m

(2) Point charges 30 nC, -20 nC, and 10 nC are located at (-1,0,2), (0,0,0), and (1,5,-1), respectively. The total flux leaving a cube of side 6 m centered at the origin is:

(a) -20 nC (b) 20 nC (c) 10 nC (d) 30 nC

(3) A potential field is given by $V = 3xy - 5y$. Which of the following is not true?

(a) The potential difference between point (2, -1, 4) and point (2, -1, -4) is zero.

(b) At point (1, 0, -1), E vanish.

(c) The electric field at (2, -1, 4) is $3a_x - a_y$ V/m.

(d) The potential at (0, 1, 0) is -5 V.

(4) Which is not an example of convection current?

(a) Electric current flowing in a copper (b) A beam of moving charges

(c) Electronic movement in a vacuum tube (d) An electron beam in cathode ray tube

(5) The relaxation time of a material having $\sigma = 10^{-17}$ mho/m and $\varepsilon_r = 5$ is

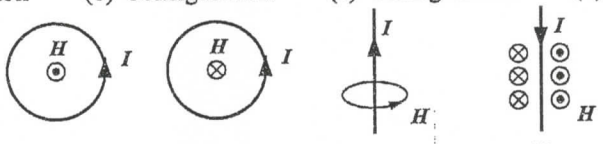
(a) 5×10^{-10} seconds (b) 10 minutes (c) 15 hours (d) 51.2 days

(6) A capacitor connected to a battery stores energy twice as much with a given dielectric as it does with air. The susceptibility of the dielectric is

(a) 0 (b) 2 (c) 1 (d) 3

(7) Identify the configuration in the figure that is not a correct representation of I and H

(a) Configuration (b) Configuration (c) Configuration (d) Configuration



(1) (2) (3) (4)

(8) Two parallel wires carry currents along the same direction. The force experienced by one due to the other is

(a) Perpendicular to the lines and (b) Parallel to the lines

(c) Perpendicular to the lines and repulsive (d) Zero

(9) The flux through each turn of a 100-turn coil is $(t^3 - 2t)$ mWb, where t is in seconds. The coil induced *emf* at t = 2 second is

(a) 1 V (b) -1 V (c) 4 mV (d) -4 mV

(10) Identify which of the following expressions is (are) not Maxwell's equations for time-varying fields:

(a) $\nabla \cdot J + \partial\rho_v/\partial t = 0$ (b) $\nabla \cdot E = -\partial B/\partial t$

(c) $\nabla \cdot D = \rho_v$ (d) $\oint H.dl = \int(\sigma E + \varepsilon\, \partial E/\partial t) \cdot ds$

Question 2	10 Points

State true (√) or false (×) and **correct the false statements**

(1) Both ε_o and χ_e are dimensionless.

(2) The electric flux density on a spherical surface r = b produced by a point charge Q located at the origin is the same as that produced by a charge of the same value as Q but distributed over the surface r=a where a<b.

(3) Inside a conductor, the electric field intensity is changes with the position.

(4) A conductor is an equipotential body.

(5) For a free-charged dielectric-dielectric interface, the tangential components of the electric flux density in the two materials are equal.

(6) Faraday's law states that the line integral of the tangential component of H around a closed path equals the net current enclosed by the path.

(7) An isolated magnetic pole exists.

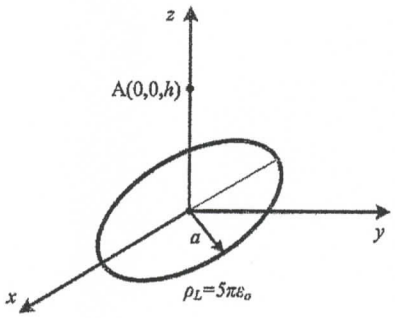
(8) The magnetic vector torque (T) on a current loop placed in a magnetic field is the vector product of its magnetic moment ***m*** and the magnetic flux density **B**.

(9) For any solid cylindrical conductor, the magnetic field inside the conductor does not contribute to its total inductance.

(10) Sometimes a voltage is induced across a conductor when it remains absolutely stationary within a steady magnetic field.

Question 3	15 Points (1,3,3,[2,2,2,2])

A circular ring of charge with radius a lies in free space in the z = 0 plane, centered at the origin and has a uniform charge density of ρ_L C/m.



(a) What is the total charge of the ring

(b) Find the electric field intensity at point A(0,0,h)

(c) Find the electric potential at point A

(d) For $\rho_L = 5\pi\varepsilon_o$ C/m and $a = 4$ m. Calculate:

(i) The magnitude of electric field intensity at point $P_1(0,0,3)$

(ii) The force acting on a unit positive-charge placed at $P_2(0,0,-3)$

(iii) The work-done needed to move a unit positive charge from point P_1 to point P_2

(iv) If a point charge Q_1 is located at the origin, Find the value of Q_1 which produce the same field intensity of the ring at point P_1

Question 4 | **15 Points (3,[4,2],[3,3])**

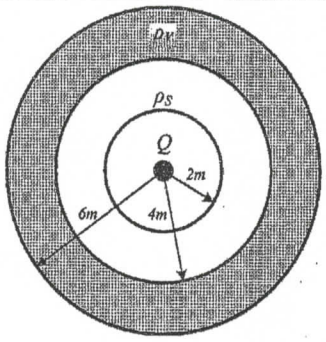
(a) Starting with Gauss's law, deduce an expression for electric field intensity of a point charge

(b) Consider the following charge distribution:

- a point charge of 10μC is located at r = 0, and
- a uniform surface charge density of $-1\mu C/m^2$ at r = 2

(i) Calculate the electric flux density D at r =1 and r = 3

(ii) What uniform volume charge density should be established in the region 4 <r< 6 for D to vanish at r=7.

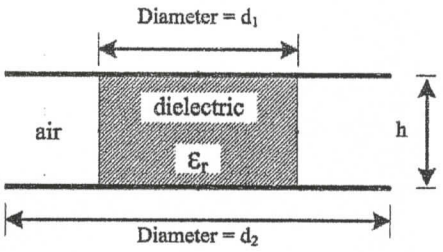


(c) For the capacitor shown in the Figure.

Find expressions for the following

(i) the capacitance

(ii) the energy density in each region



Question 5 | **16 Points (2,4,4,2,2,2)**

An infinitely long straight filament carries current of (I) lies in free-space along z-axis.

(a) Use Ampere's law to obtain the magnetic field intensity and the magnetic flux density at point (0,4 meters,0).

(b) Determine the force exerted on the filament if the area surrounding it has a magnetic flux density of $\bar{B} = \hat{a}_x - \hat{a}_y$ T.

(c) Determine the mutual inductance between the filament and a single turn rectangular coil of sides a and b placed on the x-z plane with the one of the b sides lies along the x- axis between the points $(x_0,0,0)$ and $(x_0+b,0,0)$.

(d) If the filament current varies sinusoidally with time as $I_m \sin(\omega t)$.

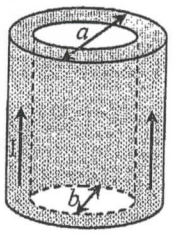
(i) Find the emf induced in the coil as well as the integral of the produced motional electric field dot dl along the turn perimeter.

(ii) Write the appropriate Maxwell's equation for the previous case in the integral form. Hence derive its differential form in not more than three steps of answer.

(iii) If the relative permeability of the medium surrounding the filament is 50 and the filament carries a dc current I, determine the magnetic polarization (magnetization).

Question 6 — **19 Points ([7,2,2],[2,6])**

(a) Consider an infinite length hollow conducting tube of conductivity σ_1 S/m carrying a current I with a uniform current density as shown in the figure.



(i) Apply Ampere's law to derive expressions for the magnetic field intensity everywhere and sketch the results as a function of the radius r

(ii) Derive a formula for the resistance per unit length of the tube

(iii) The space $0 < r < b$ is now filled with a conducting material whose conductivity is σ_2 S/m. Current I in Ampere, flows through the area $0 < r < a$ with a constant current density. Derive a formula for the voltage drop across each unit length of the filled tube

(b) A point charge of $4\pi\varepsilon_o$ mC is located at point (10,-1,1) in Cartesian coordinates in the presence of a perfectly conducting plane located at z=0 in free space.

(i) Sketch the image equivalence and the electric field lines

(ii) Calculate the electric field intensity, the electric potential and the surface charge density at (0,0,0).

Wish you all the best

Prof. Ahmed I. Shobair and **Dr. Sherif Dabour**

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امتحان مقرر دراسات بيئية
الفرقة الثانية (لائحة قديمة)
يونيو ٢٠٠٧ الزمن ساعتين

أجب عن الأسئلة الآتية:

١-أ- أذكر أهم مصادر التلوث بالموجات الكهرومغنطيسية والآثار السلبية الناجمة عن مثل هذا النوع من التلوث.

ب- اكتب عن الطرق المختلفة لتوليد الطاقة الكهربية وقارن فيما بينهم هذه الطرق فيما يخص استهلاك الموارد البيئية والتلوث البيئي المصاحب لكل وحدة من المنتج.

جـ- ماهي الاشتراطات البيئية الخاصة بإقامة محطات تقوية الجهد.

٢-أ- أكتب مذكرة وافية عن مصادر الطاقة الجديدة والمتجددة.

ب- اكتب مذكرة وافية عن طرق رفع كفاءة استخدام مصادر الطاقة التقليدية لضمان استدامة الموارد البيئية المشتركة في إنتاجها.

جـ- أكتب مذكرة وافية عن عوامل القدرة وتأثيراته وطرق تحسينه ومردود ذلك على ترشيد وعقلنة استغلال الطاقة الكهربية

د- اكتب مذكرة وافية عن المجالات الكهرومغنطيسية الناجمة عن المحولات والمعدات الثقيلة وخطوط نقل الطاقة الكهربية مع إعطاء أمثلة.

هـ- ارسم مخطط يوضح تسلسل العمليات في محطة توليد للطاقة الكهربية باستخدام الطاقة المتجددة وماهي أهم المحددات لاستخدام الطاقة المتجددة لتوليد الطاقة الكهربية.

TANTA UNIVERSITY

Faculty of Engineering

Power Engineering and Electrical Machines Department

Course	: Electromagnetic fields	**Exam**	: Final
Code	: EPM2104	**Time**	: 3 Hours
Year	: 2nd	**Department.**	: Power Engineering & Electrical Machines
Date	: 15 / 1 / 2007		

Answer All Questions:

Question(1)

a) Using Gauss's law. Derive the electric flux density due to a uniform line charge distribution ρ_l C/m lying along the z axis and extending from $-\infty$ to $+\infty$

b) Determine the electric field intensity **E** at point P(2,0,0) due to three standard charge distribution:

i) A uniform surface charge at x = - 2 m with ρ_s = - 0.2 nC/m^2 ,

ii) A uniform surface charge at x = 5 m with ρ_s = + 0.2 nC/m^2 ,

iii) A uniform line charge at x = 8 m with ρ_l = 4 nC/m.

Question(2)

a) Derive the two characteristics of the relationship between potential difference V and electric field intensity E at any point. Also write down the voltage gradient equation in spherical coordinates.

b) For the potential field V = 2 x^2 y – 5 z in free space, evaluate at point P(-4,3,6):

i) The potential

ii) The magnitude and direction of the electric field intensity

iii) The electric flux density.

iv) The volume charge density.

Question(3)

a) Aided with sketches derive the boundary conditions at surface separating two dielectrics having permittivities ε_1 , ε_2. Derive the relation between electric field intensities $\mathbf{E}_1$ and $\mathbf{E}_2$ and electric flux densities $\mathbf{D}_1$ and $\mathbf{D}_2$ in terms of θ_1 , ε_1 , ε_2 , and θ_2

b) Find the relative permittivity of the dielectric material used in a parallel plates capacitor if:

i) The capacitance, C = 40 nF, separation distance, d = 0.1 mm, and surface area, S = 0.15 m^2

ii) Electric field intensity, E = 500 kV/m, and $\boldsymbol{\rho}_s$ = 10 μC/m^2

iii)Electric flux density, D = 50 μC/m^2 and the energy density is 20 J/m^3.

Question(4)

a) Using Ampere's circuital law derive a mathematical expressions for the magnetic field intensity **H** from $\rho = 0$ to $\rho = \infty$ of an infinitely long coaxial transmission line carrying a uniformly distributed total current I in the inner solid conductor and – I in the outer hollow conductor, given that the inner solid conductor radius is h and the hollow outside conductor inner radius is b and its outer radius is c , where $h < b < c$ Sketch H versus ρ from 0 to ∞.

b) A filamentary conductor carries current of 10 A is directed from infinity to the origin along the positive x axis and then back out to infinity along the positive y axis. Use Biot-Savart law to find the magnetic field intensity **H** at P(0,0,1).

TANTA UNIVERSITY
Faculty of Engineering [Final Exam. Jan. 2006-2007] Course: Energy Conversion
2nd Year (Dept. Electric Power & Machines Eng.) Old Curriculum
Time: 3 hours

ملاحظات هامة: لاتعوض عن أى من μ_0 و π بقيمتها (المعروفة) بل اترك الأجوبة بدلالتهما
افرض رموزا أو قيما واقعية لأى معطيات لم تذكر و تحتاجها
وضح اجابتك بأشكال توضيحية مرسومة بعناية ومعادلات كلما أمكن ذلك

Attempt all questions
من فضلك لاحظ أن درجات الأسئلة مختلفة

Question 1

a For the machine shown in Fig. 1, derive an expression for the mutual inductance between the two windings taking the fundamental component of stator flux density. (10 points)

b For a slotted armature: i) sketch the flux lines in a slot. Show that there is little force on conductors in slots. ii) show that there is a strong force exerted on the iron teeth by deriving an expression for the mechanical torque applying the principle of conservation of energy. For this purpose, assume no change in stored energy and no electrical or mechanical losses. (5 points)

Questions 2

Fig. 2 shows a section a section of a machine having two identical stator windings aa', bb', in quadrature. The self inductance of the each stator winding is L_{ss} and the rotor wing is L_{rr} and they are constants independent of θ_s. The mutual inductance between a stator winding and the rotor winding is a function of the angular position of the rotor as follows: $M_{s/} = M \cos \theta_s$; $M_{s/} = M \sin \theta_s$, where M is the maximum value of the mutual inductance. The rotor winding is excited with dc I_f. The rotor is revolving at a synchronous speed so that its instantaneous angular position is given by $\theta_s = \omega t - \delta$. The resistance of each of the stator phases is r and that of the field winding is r_f. Derive expressions for the open circuited terminal voltage of each coil in terms of the given data. (10 points)

Question 3

a Draw a developed sketch of winding that produce a pulsating mmf in rotating machine. Show by equations that such mmf can be decomposed into two rotating mmf's . (5 points)

b Derive an expression for the torque developed by a cylindrical synchronous motor having two poles similar to that shown in Fig. 2 but without the winding bb. The rotor windings are excited with dc current I_f, while the stator winding is connected to an ac source with current $i_s = \sqrt{2}\, I_s \cos \omega t$.. L_{ss} and M_{sf} may be assumed as in question 2..
(i) Write an expression for the energy stored in terms of ω and ωangular position θ_s.
(ii) What is the rotor speed ω_s at which an average torque will be produced?
(iii) Find the average torque. (15 points)

Question 4

a For a singly –excited translational system, derive expressions for current, flux linkage, force in the form of stored energy or coenergy. (15 points)

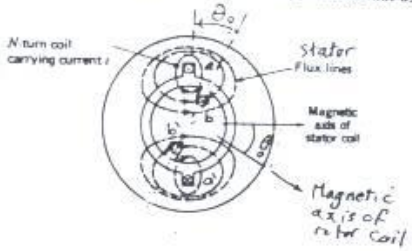
b Show that the energy stored in a rotating magnetic system given by $W_s(\lambda_0,\theta_1) = \int_0^{\lambda_0} i(\lambda,\theta_1)d\lambda$ regardless of how λ varies with θ. ___Hint: Integrate $d\lambda$ over a two-section path: one with $\lambda = 0$ and the other with θ = constant. (5 points)

c Prove an expression for the differential force that acts on a current carrying conductor of differential length dl placed in a magnetic field of density B tesla. (5 points)

Question 5

a State with illustrations three different types of the collectors used with applications of solar electric energy. (10 points)

b Draw a sketch of a domestic application that uses solar heat energy. (10 points)



(a)

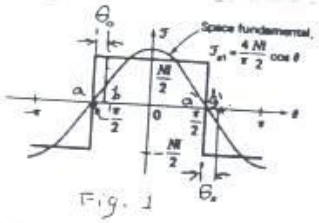


Fig. 1

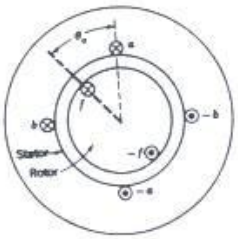


Fig. 2

END OF EXAM **LUCK ◄GOOD► BYE**

جامعة طنطا – كلية الهندسة
قسم هندسة الحاسبات والتحكم الآلي
امتحان الفصل الدراسي الأول للعام الجامعي ٢٠٠٦/ ٢٠٠٧

الفرقة الثانية حاسبات-اتصالات- قوى كهربية (قديم)
المادة : تحليل الدوائر الكهربية
الزمن : ثلاث ساعات يناير ٢٠٠٧

Answer the following six questions:

Q(1): For the circuit in Fig. Q1

a) Prove that $V_o = \frac{R_f}{R_a}(V_b - V_a)$ when $\frac{Ra}{R_b} = \frac{R_c}{R_d}$

b) For $\frac{Ra}{R_b} = \frac{R_c}{R_d} = \frac{1}{5}$, $V_b = 4.0$ V and $V_{cc} = 10$ V, what range of values for V_a will result in linear operation?

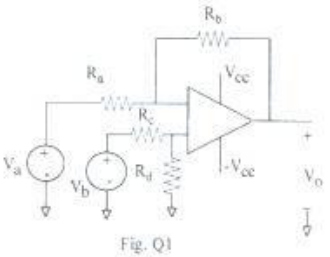


Fig. Q1

Q(2): The voltage pulse described by the following equations is impressed across the terminals of 0.5 μF capacitor:

$V(t) = 0 \quad t \le 0$

$V(t) = 4t \quad 0 \le t \le 1$

$V(t) = 4\,e^{-(t-1)} \quad 1 \le t \le \infty$

a) Derive the expressions for the capacitor current, power, and energy.

b) Specify the interval of time when energy is being delivered by the capacitor.

Q(3): a) Deduce the current response for an RL circuit with step voltage source.

b) The current source in the circuit generates the current pulse shown in Fig. Q3. There is no energy stored at $t = 0$.

1- Derive the numerical expressions for v(t) for the time intervals $t < 0$, $0 < t < 40$ μs, and 40 μs $< t < \infty$

2- Calculate $v(60^- \mu s)$ and $v(60^+ \mu s)$

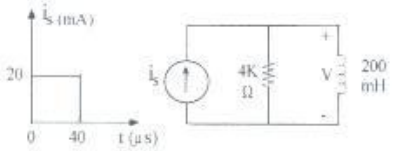


Fig. Q3

Q(4): The switch in the circuit shown in Fig. Q4 has been in position **a** for a long time. At $t = 0$ the switch is thrown to position **b**. Find

a) V_c for $t \ge 0$

b) i(t) for $t \ge 0^+$

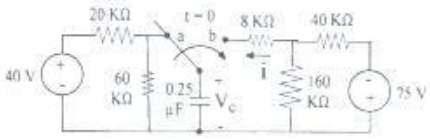


Fig. Q4

Q(5): The uncharged capacitor in the circuit shown in Fig. Q5 is initially switched to terminal **a** of the three position switch. At t = 0 the switch is moved to position **b**, where it remains for 20 ms. After the 20 ms delay, the switch is moved to position **c**, where it remains indefinitely.

a) Derive the numerical expression for the voltage across the capacitor.
b) Plot the capacitor voltage versus time.
c) When will the voltage on the capacitor equal 200 V ?

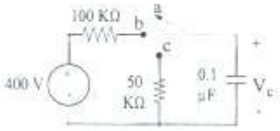


Fig. Q5

Q(6): The initial energy stored in the circuit in Fig. Q6 is zero. At t = 0, a dc current source of 24 mA is applied to the circuit.

a) What is the initial value of I_L and dI_L/dt ?
b) What is the numerical expression for $I_L(t)$ when $t \geq 0$?

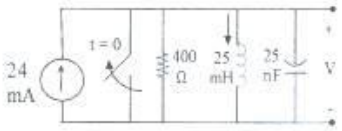


Fig. Q6

مع أطيب الأمنيات بالتوفيق والنجاح

Answer the following questions :-

1-a) Consider the one – dimensional heat equation $u_t = u_{xx}$, $0 \le x \le 1$, $t \ge 0$ with the boundary conditions $u(0,t) = 0$, $u_x(1,t) = 1$

Compute the first two rows of the solution if $h = \frac{1}{3}$, $k = \frac{1}{18}$ and the initial condition $u(x,0) = x$.

1-b) Use Euler's method to find y at $x = 0.2, 0.4$, if $y'' = 4yy' + xy$, $y = 2$ and $y' = 1$ at $x = 0.1$.

2-a) Evaluate $\int_4^{5.2} \ln x \, dx$ correct to 6 decimal by using Simpson's rule .

2-b) Find $f(0.7)$ from the following readings

x	0 . 4	0 . 6	0 . 8	1
y	0 . 3799	0 . 537	0 . 664	0 . 7616

3 –a) Fit the curve $y = a + bx$ to the readings

x	0.5	1.0	1.5	2 . 0	2 . 5	3 .0
y	0 . 3 1	0 . 82	1 . 29	1. 85	2 . 51	3 .0 2

and find the root mean square of the errors .

3- b) Use the simple iteration method to obtain the smallest positive root of the equation $x^3 - 8x + 5 = 0$ correct to five decimal places .

3-c) By the use of Gauss – Seidel method solve the system of linear equations
$5x_1 - x_2 + 3x_3 = -2$, $x_1 + 5x_2 - 2x_3 = 10$, $2x_1 - 4x_2 + 10x_3 = 6$

4-a) To what degree of accuracy can we calculate $\sqrt{115}$ by means of Lagrange's interpolation formula for the function $y = \sqrt{x}$ if we choose the interpolation $x_0 = 100$, $x_1 = 121$, $x_2 = 144$?

4- b) From the following table , find the number of students who obtained less than 45 marks

Marks	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80
No. of St	31	42	51	35	31

كلية الهندسة | امتحان الفصل الدراسي الأول | المادة : الاقتصاد الهندسي
جامعة طنطا | ٢٠٠٥ / ٢٠٠٦ | السنة : الثانية (حاسبات + اتصالات)
د/ الشناوي عبد الحميد شعبان | يناير ٢٠٠٦ | الزمن : ساعتان

أجب عن الأسئلة الآتية :-

السؤال الأول

- اذكر العناصر المطلوبة لإقامة منشأة صناعية ؟
- ارسم دائرة الإنتاج ؟
- اشرح مع الرسم تأثير قانون العوائد المتناقصة ؟
- عامل يتقاضى 12 جنيه لكل ساعة لقاء إنتاج 20 قطعة بالساعة على آلة تبلغ تكلفة إدارتها 8 جنيه بالساعة فإذا وجد عامل آخر أكثر تفوقا من الأول بحيث ينتج 18 قطعة بالساعة فاحسب التكاليف الكلية للقطعة الواحدة في كلتا الحالتين ثم احسب التكاليف عندما تقوم بالعمل عامل ثالث ينتج 25 قطعة بالساعة وما هي الملاحظات التي يمكن أن تستنتجها .

السؤال الثاني

- اذكر ما تعرفه عن الطلب والعرض والمرونة ؟ ثم وضح الفرق بين مرونة الطلب ومرونة العرض ؟
- اشرح مع الرسم منحنى الحذر والخطأ ؟
- ما هو المبلغ الذي يجب إيداعه في 1 يناير 1984 وكل 6 شهور بعد ذلك حتى 1 يوليو 1992 لكي يتم سحب 1000 جنيه كل 6 شهور لمدة 5 سنوات تبدأ في 1 يناير 1993 . والربح الاسمي هو 11 % مع التركيب نصف السنوي ؟ استخدم القانون مرة في الحل ثم الجدول مرة أخرى في الحل ؟

السؤال الثالث

- اذكر فوائد حساب التكاليف ؟ ثم وضح بالشكل عناصر التكاليف ؟
- اشرح مع الرسم طريقة التعادل ؟
- اقترض مصنع ما مبلغ 20000 جنيه بفائدة بسيطة قدرها 10 % سنويا واتفق مع الدائن على سدادها خلال خمس سنوات والمطلوب توضيح خطط السداد مستخدما ثلاث طرق مختلفة ؟

TANTA UNIVERSITY	Course:: Electrical Machines
Faculty of Engineering	2nd Year
Dept. of Computer &Control Eng	Time: Three hours

FINAL EXAM. 2005-2006

Question 1

a) Explain how is eddy-current loss in transformers affected by magnitude and frequency of the applied voltage. How can it minimized?

b) By giving reason(s)مع ذكر الاسباب لتدعيم الاجابة mention what will happer the machine laboratory when the mechanical load is remo completely while a dc series motor is running.

c) Aided with ONE equation ONLY, suggest three methods for sp control of dc motors. State the effect(s) of varying each parameter the speed. غير مطلوب اي رسومات

d) Using a variable frequency source to control the speed of a th phase induction motor, if the voltage is kept constant, what will be effect on the machine flux? What is (are) the limitations of freque reduction? Verify your answer with equation(s).

e) Draw ONLY diagram(s) to show how the direction of rotation squirrel-cage induction motor can be reversed.

f) Draw coil connection diagram(s) of a phase of three phase induc motors to show how the number of poles can be changed. What ef does this have on the operating speed.

g) Suppose that, for a given excitation and load, a synchronous m draws a unity pf current. The load is then kept constant while excitation is increased. Aided with a phasor diagram, discuss change in the power factor and armature current.

h) Aided with illustration(s), explain the basic construction تركيب and principle of operation of a selsyn.

i) Aided with illustration(s), explain three applications of li motors.

Question 2

The parameters of the equivalent circuit of a 150 kVA, 2400 -V/2 transformer, are r_1 = 0.2 Ohm, r_2 = 2 Ohms, x_1 = 0.45 Ohm, x_2 = Ohms, R_c = 10 k. Ohms, X_m = 1.55 k. Ohms. Using the approxi equivalent circuit referred to the primary, determine the (a) vol

regulation and the efficiency of the transformer operating at rated loac with 0.8 lagging power factor.

Question 3

In a long-shunt compound generator, the terminal voltage is 230V when generator delivers 150A. Determine i) the induced e.m.f. ii) tota power generated iii) distribution of this power, given that: shunt field series field, diverter and armature resistances are 92, 0.015, 0.03 and 0.032 Ohms respectively.

b) A 250- V, dc shunt motor draws d full-load line current of 100 A a the rated speed of 1200 r/min. The armature circuit resistance R_a is 0.1 ohm and the field winding resistance is 250 ohm;. Determine (a) the gross full-load mechan3ical power output, (b) the electromagnetic torque developed at full load, and (c) the speed regulation, if the no-load armature-winding current is 10 A.

Question 4

A 2300-V, 3-phase, wye-connected, round-rotor synchronous motor has x_s = 2 Ohm per phase and R_a = 0.1 Ohm per phase. The motor operates at 0.866 leading power factor while taking a line current o 350 A. Find the rms value of the induced phase voltage, the power angle, and the developed and maximum torque.

Question 5

A 3-phase slip-ring motor has negligible stator-winding resistance, the total leakage reactance referred to the rotor being 5 Ohms per phase and the rotor-winding resistance 0.45 Ohm per phase. When running with slip rings short-circuited and exerting full load torque the slip is 3%. Determine (i) the external rotor resistance per phase to give ful load torque at starting, and (ii) the external rotor resistance per phase to give a stable speed of 50% of synchronous speed with a torque o 50% of full load torque.

END OF EXAM LUCK◄GOOD►BYE

Tanta University	Final Exam First Term (2006-2007) (لائحة جديدة وقديمة)	Dep. of Phys. Math Eng.
Faculty of Engineering	Date of Exam : 28/1/2006	
Second Year Students	January 2007	
Second Elec.	Engineering Mathematics	Time : 3 hours

Answer the following questions :

1- a) Discuss the continuity of the function $f(z)=\begin{cases}\dfrac{\mathrm{Re}(z)}{1+|z|} & ,z\neq 0\\ 0 & ,z=0\end{cases}$ **at z = 0.**

b) State the polar form of Cauchy Riemann equations and then prove that $\frac{d}{dz}(z^n)=nz^{n-1}$.

c) Show that $u(x,y)=e^x\cos y$ **is a harmonic function in the whole plane , find a harmonic conjugate** $v(x,y)$ **of** $u(x,y)$ **such that** $w=u+iv$ **is analytic.**

2- a) State without prove Cauchy integral theorem. Give an example to show that $\oint_C f(z)dz=0$ **while** $f(z)$ **is not analytic inside** C.

b) Evaluate $\oint_{|z-i|=2}\frac{\sin z}{z^4}dz$, $\oint_C\frac{3z^2+2}{(z-1)(z^2-9)}dz$, $C:|z-2|=3$, **and** $\oint_{|z-\frac{1}{2}|=2}\frac{z-1}{z(z-2)(z+4)}dz$.

c) Evaluate $(1+i)^{\frac{1}{3}}$ is the sum of the result roots equal zero?.

3-a)Find a series solution for the differential equation $4xy''+2y'+y=0$.

b) Prove that $\Gamma(\frac{1}{2})=\sqrt{\pi}$, $J_{\frac{1}{2}}(x)=\sqrt{\frac{2}{\pi x}}\sin x$.

c) Evaluate $\int_0^1 x^m(\ln x)^n dx$, $\int_0^{2\pi}\sin^8\theta d\theta$.

4) a) **Prove that Laplacian operator in the spherical polar co-ordinates take the form**

$$\nabla^2 V=\frac{1}{r^2}\frac{\partial}{\partial r}(r^2\frac{\partial V}{\partial r})+\frac{1}{r^2\sin\theta}\frac{\partial}{\partial\theta}(\sin\theta\frac{\partial V}{\partial\theta})+\frac{1}{r^2\sin^2\theta}\frac{\partial^2 V}{\partial\phi^2}$$

b) **Reduce the Laplace equation in spherical polar co-ordinates into three ordinary differential equations.**

د. أمجد سالم إبراهيم

With my best wishes

انتهت الأسئلة

بسم الله الرحمن الرحيم* لا اله إلا الله محمد رسول الله

جامعة طنطا كلية الهندسة قسم هندسة القوي والالات الكهربية

الفرقة:٣ق ك -لائحة ق امتحان نهاية الفصل الدراسي الثاني مايو ٢٠٠٧ م مادة: اختبارات كهربية

اليوم: الخميس ٢٠٠٧/٥/٣١ م الزمن :ثلاث ساعات الدرجة العظمي: ٦٠ درجة

أجب علي الأسئلة الآتية والدرجة موزعة بالتساوي

استعن برسم الدائرة المكافئة, مخطط المتجهات, المعادلات كلما امكن

١- 1.) Write the methods which used for measuring the active power in three phase circuit.

2.) Explain the suitable one of them for measuring the input power for unsymmetrical, three phase, star connected, inductive load.

3.) Explain how one can be measure the total reactive power of a three phase, symmetrical , delta connected, capacitive load.

٢- 1.) The transmission lines can be classified into; short, medium and long lines. Explain how can be calculated the performance of Π- model line, in the laboratory.

2.) If the results of the following table represents an actual measurement for medium line at full load. Calculate the line parameters (Z, R, X), efficiency and regulation. Use the Π-model and assume $\Delta V = Vs - Vr$, $Il = Ir$ from the table.

Is (A)	Vs (v)	Ps (w)	Ir (A)	Vr (v)	Pr (w)
10.5	227	2220	10	220	1905

٣- 1.)A d.c. ring distribution network has three loads. It is simulated in the laboratory by its equivalent circuit. Describe how determination the performance of this network at full load (i.e all loads are on the full ratings).

2.) For a 2-wire ring line, shown in Fig.1, the measuring of sending current and voltage are 30 A. & 200 v., the load currents at points 1, 2, 3 are 5 A., 15 A., 10A. respectively. The resistance of line sections are equal (i.e Rs1= R12= R23 =R3s) and each section(go and return) has 0.1 Ω . Find: (a) the current and power loss in its section. (b) the voltage of the nodes 1, 2, 3.

٤- Explain how can study the potential distribution over a string of suspension insulator has four units in the laboratory, don't use a guard ring. If Eph= 220 Kv, m=0.1, f=50 Hz, C=0.01 μF. Calculate the potential across the four insulation units and the maximum leakage current.

(تم بحمد الله والحمد لله رب العلمين)

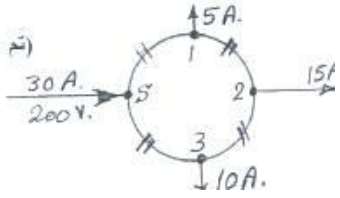


Fig.1

جامعة طنطا ـ كلية الهندسة الفرقة / الثانية (حديث) المادة / آلات كهربية	امتحان الفصل الدراسي الثانى التاريخ : ٢٠٠٧/٦/١٤	بسم الله الرحمن الرحيم قسم هندسة القوى والآلات الكهربية الزمن / ٣ ساعات

ANSWER THE FOLOWING QUESTIONS:

1-a) Sketch the power-flow diagram for a DC motor and for a DC generator (label all losses) . Also, discuss with a suitable drawing the manual starter for a DC shunt motor.

b) A 15 hp, 240 V, 1840 r.p.m shunt motor draws 52 A when operating at rated conditions. The resistance of the shunt field windings is 120 Ω,and the resistance of the armature is 0.4Ω, Determine the no-load speed, assuming the total losses at no-load is 960W

2-a) Show with the aid of suitable drawing the steady state speed and torque characteristics for shunt, series and compound motors.

b) A 100 hp, 650 r.p.m, 240 V series motor has an efficiency of 89.6 %when operating at rated conditions. The series field has 15 turns / pole and the equivalent demagnetizing mmf due to armature reaction is approximately 4 % of the series mmf. The motor parameter are:

	Armature	Interpole	Series
Resistance, (Ω)	0.0202	0.00588	0.00272

The magnetization curve for the motor has the following characteristics

MMF (AT / pole)	1000	2000	3000	4000	5000	6000	7000
Flux density (T)	0.24	0.50	0.69	0.83	0.90	0.96	1.00

Determine the new speed if the load is reduced to a value that causes the armature current to be 40 % of rated current.

3-a) State in detail the procedure for paralleling one DC generator with another that is already on the bus. Include in your statement the instruments observed and the equipment operated.

b) Three 240 V DC generator are operating in parallel and taking equal shares of a 3000 A, 240 V bus load. The regulations as well as the ratings of the generators are:

Generator	A	B	C
Regulation %	3	4	5
Rated power (Kw)	400	300	200

If the total load drops to 2000 A Determine:

(i) New bus voltage. (ii) Current supplied by each machine.

P.T.O

4-a) Prove that for small DC motors having an output power = P, an efficiency = η and stray losses = 1/3 total losses, the armature power is given by :

$$P_a = P\left(\frac{1+2\eta}{3\eta}\right).$$

b) Find the diameter and length of armature for a DC motor having the following data: armature power, P_a = 100Kw, speed = 900 rpm, Number of poles = 4. The product of specific magnetic and electric loading is related to diameter as follows:

D (m)	0.1	0.2	0.3	0.4	0.5	0.6
Bav.ac	5200	9300	12700	15500	18000	20000

Take ratio of pole are to pole pitch = 0.86, and select the design which gives a square pole face.

5-a) Prove that, for a cylindrical body, the moment of inertia is given by $J = \frac{\pi}{32}\rho D^4 L$.

where ρ is the mass density.

b) A control motor is required to operate form a 36 V DC supply and to provide a torque of 0.8 N.m at 150r.p.s. The armature length is to be twice of armature diameter.

(i) Estimate the main dimensions of the armature. The average air-gap density = 0.35 Web./m^2 and amper- conductors per meter = 8000.

(ii) Assuming that the average density of rotor material is about 6000 Kg/m^3, estimate the moment of inertia of the armature. It may be assumed that the moment of inertia of commutator, shaft and overhang is approximately equal to that of cylinder of magnetic material.

GOOD LUCK

Tanta University
Faculty of Engineering
Electerical Power Engineering Department

Final Term Exam (June, 2007)
Second Year, Power Plants
Time allowed 3 hour

Notes: The exam paper consists of **three pages (ten questions)**. **Answer all questions**
For the exam committee, **Please allow steam tables** inside the exam theater.

Question No. 1 (Mark is 5% of the total mark):
Define using appropriate sketches: thermodynamic state, thermodynamic process, thermodynamic cycle, closed thermodynamic system and open thermodynamic systems.

Question No. 2 (Mark is 3% of the total mark): (Choose the correct answer, giving appropriate explanations)
Electric heaters are commonly used for heating purposes. The energy transformed during this heating process is ..??.. .

i) Heat energy,
ii) Work energy
iii) Internal energy
iv) Both of i and ii.

Question No. 3 (Mark is 3% of the total mark): (Choose the correct answer, giving appropriate explanations)
Thermal efficiency of a vapor power plant in the winter is ..??.. that in the summer.

i) equal to,
ii) less than
iii) greater than
iv) greater than by unity

Question No. 4 (Mark is 6% of the total mark):
Consider a refrigerator and a heat pump, both of them taking and rejecting same amounts of heat (Q_{in} and Q_{out}), choose the correct answer and give appropriate explanations:

a) the coefficients of performance of the refrigerator:
   i) may be greater than unity,
   ii) must be greater than unity
   iii) never be greater than unity
   iv) non of the above
b) the coefficients of performance of the heat pump:
   i) may be greater than unity,
   ii) must be greater than unity
   iii) never be greater than unity
   iv) non of the above
c) the coefficients of performance of the refrigerator is ...??... the coefficients of performance of the heat pump:
   i) equal to,
   ii) less than
   iii) greater than
   iv) less than by unity

Question No. 5 (Mark is 8% of the total mark):
A simple ideal Brayton cycle is modified to incorporate multistage compression with intercooling, multistage expansion with reheating, and regeneration without changing the pressure limits of the cycle. As a result of these modifications, deduce with appropriate explanations:

a) Does the net work output increase, decrease, or remain the same?
b) Does the back work ratio increase, decrease, or remain the same?
c) Does the thermal efficiency increase, decrease, or remain the same?
d) Does the heat rejected increase, decrease, or remain the same?

Question No. 6 (Mark is 5% of the total mark):
Mention five differences between vapor power plants and gas power plants.

Question No. 7 (Mark is 10% of the total mark):

One kg of air undergoes a thermodynamic cycle consisting of three processes.

- ***Process 1–2:*** compression at constant specific volume
- ***Process 2–3:*** constant-temperature expansion
- ***Process 3–1:*** constant-pressure compression

At state 1, the temperature is 300 K, and the pressure is 1 bar. At state 2, the pressure is 2 bars. Applying the ideal gas equation of state,

a) sketch the cycle on p–v coordinates.
b) determine the temperature at state 2,
c) determine the specific volume at state 3, in m^3/kg.

Question No. 8 (Mark is 10% of the total mark):

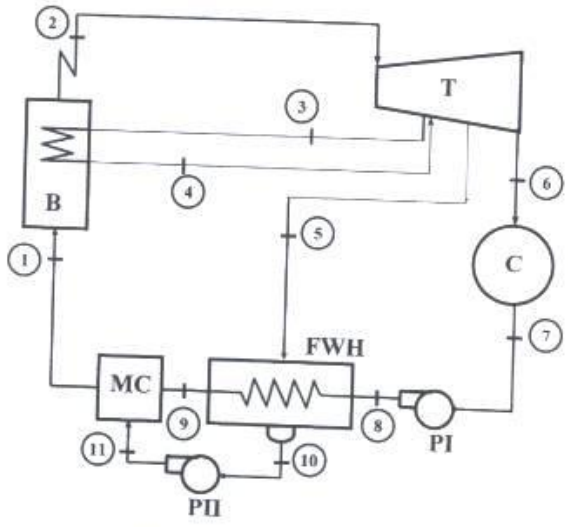
At steady state, a refrigerator whose coefficient of performance is 3 removes energy by heat transfer from a freezer compartment at 0 °C at the rate of 6000 kJ/h and discharges energy by heat transfer to the surroundings, which are at 20 °C. Determine the power input to the refrigerator and compare with the power input required by a reversible refrigeration cycle operating between reservoirs at these two temperatures.

Question No. 9 (Mark is 25% of the total mark):

A steam power plant operates on the reheat regenerative Rankine cycle with a closed feed water heater, as shown in the figure. Steam enters the turbine at 12.5 MPa and 550°C at a rate of 24 kg/s and is condensed in the condenser at a pressure of 20 kPa. Steam is reheated at 5 MPa to 550°C. Some steam is extracted from the turbine at 1.0 Mpa and is completely condensed in the closed feed water heater, and then it is pumped to 12.5 MPa before it mixes with the feed water at the same pressure. Assuming an isentropic expansion and compression in both the turbine and the pumps, draw the cycle on a T-S diagram then, determine:

a) the temperature of the steam at the inlet of the closed feed water heater,
b) the mass flow rate of the steam extracted from the turbine for the closed feed water heater,
c) the net power output, and
d) the thermal efficiency.

B : **B**oiler
T : **T**urbine
C : **C**ondenser
PI : **P**ump **I**
PII : **P**ump **II**
FWH : **F**eed **W**ater **H**eater
MC : **M**ixing **C**hamber



Question No. 10 (Mark is 25% of the total mark):

A gas power plant operates on the regenerative Brayton cycle between the pressure limits of 100 and 1200 kPa. The cycle contains two stages of expansion with inter-reheating and two-stages of compression with intercooling. The working fluid is air. The air enters the first and the second stages of compressions at 300 K and 350 K, respectively, and the first and the second stages of expansions at 1400 K and 1300 K, respectively. Assuming both the compressor and the turbine have an isentropic efficiency of 85 percent and the regenerator has an effectiveness of 80 percent and using constant air specific heat of 1.005 kJ/kg K, draw the schematic diagram for the plant and represent the cycle on a T-S diagram then, determine

a) the back work ratio and the net work output,
b) the thermal efficiency,

With best wishes

Dr. Kh. Khodary

Tanta University – Faculty of Eng. | Mathematics | Date: 7/ 6/2007
Phys. & Math. Dep. | Second Year [Elec.] | Time : 3 hour

Answer the following questions

1-a) Prove that , the necessary and sufficient condition for f (z) to be analytic in a simply connected domain D is $\oint_c f(z)dz=0$ where c is a closed contour in D .

1-b) Solve the equation $\cos z=5$

1-c) Evaluate $\oint_{|z|=3} \frac{\sin \pi z^2+\cos \pi z^2}{(z-1)(z-2)}dz$

1-d) Find the Maclaurine series of $f(z)=\frac{1}{1+z^2}$ and hence find Maclaurine series of $\tan^{-1} z$

1- e) Evaluate $\oint_{|z|=\frac{5}{2}} \frac{z^2-2z}{(z+1)^2(z^2+4)}dz$

2- a) Find the series solution of the D . E . $y''+4xy'-8y=0$. Find the particular solution that passes through the point (0 , 2) and having $y'=0.2$ at this point .

2- b) Find the series solution of the D . E . $4xy''+2y'+y=0$

3-a) Evaluate the following integrals

$(i)\ \int_0^1 \sqrt{-\ln z}\,dz$ $(ii)\ \int_0^\infty t^{\frac{-3}{2}}(1-e^{-t})\,dt$

$(iii)\ \int_0^4 y^2\sqrt{4-y}\,dy$ $(iv)\ \int x^4 J_1(x)\,dx$

3-b) Express $J_{\frac{3}{2}}(x)$ and $J_{-\frac{3}{2}}(x)$ in terms of sin x and cos x .

3- c) Prove that , $J_k'=\frac{1}{2}(J_{k-1}-J_{k+1})$

بسم الله الرحمن الرحيم

جامعة طنطا — امتحان: الفصل الدراسي الثاني

كلية الهندسة — الفرقة الثانية: قوى و آلات كهربية

قسم هندسة القوى والآلات الكهربية — المادة: خطوط نقل وتوزيع القوى الكهربية

تاريخ الامتحان : ٢٨ / ٥ / ٢٠٠٧ — الزمن: ٣ ساعات

Answer the following questions:

1-A) Derive the **A,B,C** and **D** constants for the network consisting of two network in parallel.

B) A three phase ,50Hz transmission line consists of two circuits connected in parallel with the following constants

$\mathbf{A_1=D_1}= 0.9 \angle 1.5°$ — $\mathbf{A_2=D_2}= 0.95 \angle 1.2°$

$\mathbf{B_1}= 85.0 \angle 82° \ \Omega$ — $\mathbf{B_2}= 80.0 \angle 84° \ \Omega$

$\mathbf{C_1}= 0.0005 \angle 90°$ mho — $\mathbf{C_2}= 0.0008 \angle 90°$ mho

Find the **A**, **B**, **C** and **D** constants of the system. If the line delivers a load of 110.0 MW at 0.9 lagging power factor and 132.0 kV, draw the combined sending and receiving end power circle diagram and find: -

i) The characteristics at the sending end, the efficiency and voltage regulation.

ii) The maximum power transferred, the efficiency and corresponding power factor.

iii) The required reactive power at the receiving end in order to maintain both the sending and receiving end voltages equal to 132.0 kV for load of 110.0 MW and 0.9 lagging power factor.

2-A) Explain, Disadvantages of low power factor.

B) A generating station supplies power to the following -

lighting load 100kW,

an induction motor 400h.p., power factor 0.9 lagging and efficiency 0.95,

a rotary converter giving 100A at 500V at an efficiency of 0.95.What must be the power factor of the rotary converter in order that the power factor of the supply station may be unity ?

3-A) Mention methods of voltage control.

B) Describe, ways of improving the line voltage regulation and comparison between series and shunt capacitors.

4-A) Find the relation between the generalized circuit constants (**A**,**B**,**C** and **D**).

B) Figure **1** shows a one line diagram of a simple three -phase transmission network . The values of the per-unit impedance's are shown in the Figure.

i) Find the bus admittance matrix, $(\mathbf{Y}_{bus})$.

ii) Eliminate nodes **4** , **5** and **6** of the circuit of Figure **1** by matrix algebra, and draw the circuit described by the resulting matrix.

---

5) A 15000 KVA , 8.5KV three – phase generator has a subtransient reactance of 12 %. It is connected through a Δ-Y transformer to a high –voltage transmission line having a total series reactance of 80 Ω At the load end of the line is a Y- Y step –down tranformer. Both transformer banks are composed of single –phase transformers connected for three- phase operation Each of the three transformers composing each bank is rated 6667 KVA ,10-100 KV , with a reactance of 12 % The load, represented as impedance is drawing 10000 KVA at 12 5 KV and 85 % power factor lagging Draw the one-line diagram and mark base KV in the three parts of the system . Then draw the impedance digram showing all impedances in per unite . Choose a base of 10000 KVA ,12 5KV in the load circuit Determine the voltage at the terminals of the generator

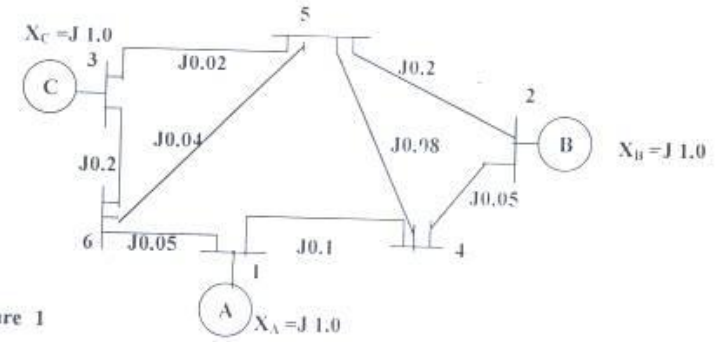


Figure 1

GOOD LUCK

جامعة طنطا

كلية الهندسة　　تقارير فنية　　دور مايو ٢٠٠٦-٢٠٠٧

قسم هندسة القوى الكهربية　　ثانية كهرباء قوى　　الزمن ساعتين

السؤال الاول

١-ما هى الشروط الواجب إتباعها عند استخدام الجداول فى التقارير ؟

٢- ما هى مميزات التقارير المكتوبة ؟

٣- كيف تكتب مقدمة التقرير بصورة جيدة؟

السؤال الثانى

١- ما هى مميزات برامج مولدات التقارير مع الشرح ؟

٢- ما هى أنواع التقارير من الزوايا المختلفة ؟

٣- ما هى أنواع الأشكال التوضيحية المستخدمة فى التقارير مع الشرح ؟

السؤال الثالث

١- ما أهمية استخدام العروض التقدمية ؟ وما هى الوسائل المساعدة المستخدمة ؟

٢- ما هى المراحل الأساسية لكتابة التقارير ؟

٣- ماهى الشروط الواجب اتباعها لكتابة المعادلات فى التقرير ؟

السؤال الرابع

١- ما هى الأنواع المختلفة لمخطط الصفحة وفيما يستخدم ؟؟

٢- اكتب ١٠ من القواعد العامة لإعداد التقارير ؟؟

٣- اكتب مقاسات الورق العالمية الاتية واستخدام لكلا منها

A0, A1, A2 , A3, A4, A5

مع أطيب التمنيات بالتوفيق

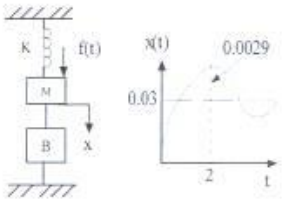
أ.م.د عبد النبى قابيل

جامعة طنطا – كلية الهندسة
قسم هندسة الحاسبات والتحكم الآلي
امتحان الفصل الدراسي الثاني للعام الجامعي ٢٠٠٦/٢٠٠٧

المادة : أسس التحكم الآلي
الفرقة : الثانية قوي كهربية(لائحة قديمة)
الزمن : ثلاث ساعات

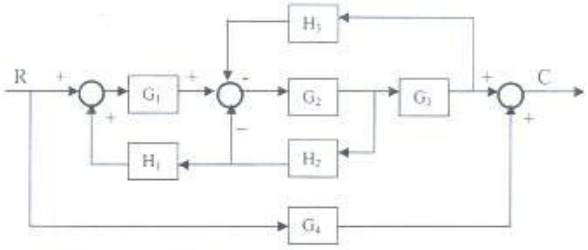
Answer the following questions:

Q1: Figure shows a mechanical vibratory system. When 8.9 N of force is applied to the system, the mass oscillates, as shown in Figure. Determine M, B and K of the system from this response curve.



Q2: Determines the overall transfer function C/R using

a) Block diagram reduction. b) Signal flow graph.



Q3: a) For each of the following characteristic equations, find the root distribution and determine whether the system is stable, marginally stable, or unstable:

i) $S^3 + 8S^2 + 19S + 12 = 0$
ii) $S^4 + 2S^3 + 3S^2 + 6S + 1 = 0$
iii) $S^3 + 2S^2 + 4S + 8 = 0$

b) For the open loop gain $G(S)H(S) = \dfrac{K(S+3)}{S(S+5(S+6)(S^2+2S+2)}$.

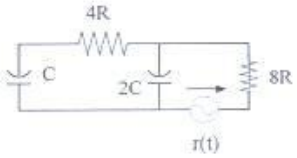
Find the range of K that the system is stable.

Q4: Draw the root locus of the following system

$$kG(s)H(s) = \frac{k(s+1)}{s(s-1)(s+6)}.$$

Then determine poles and gain if settling time 4sec, for 2% error to step response.

Q5: Obtain the state space representation for the system shown, if the voltages in the capacitors are taken as state variables. Then find the state transition matrix.



Q6: a) Transform the following system to diagonal form.
Then draw the obtained state diagram.

$$\dot{\underline{X}} = \begin{bmatrix} 0 & 1 \\ -4 & -5 \end{bmatrix} \underline{X} + \begin{bmatrix} 1 \\ 0 \end{bmatrix} u$$

$$y = [1 \quad 2]\underline{X}$$

Then, determine whether the given system in (a) is completely state controllable and observable or not.

b) For the system that have the following transfer function

$$\frac{Y(s)}{U(s)} = \frac{s^2 + 15s + 50}{(s+1)(s^2 + 6s + 8)}$$

Give the state space in pole-zero form.

مع أطيب الأمنيات بالتوفيق والنجاح

TANTA UNIVERSITY

Faculity Of Engineering

Electrical Power and Machines Engineering Department

Course : Power Electronics(1) Time : 3 hours

Year : 2nd year(Power&Machines). Date : 4/6/2007

Answer All The Questions

#Clarify your answer with the suitable sketches as you can

The first question

a) Derive an expression for the average voltage drop due to commutation in 3-ϕ controlled rectifier.

b) Explain the function of the Freewheeling diode.

c) Explain using the 1--ϕ full converter to reverse the direction of rotation of DC motor .

d) Compare between the power transistor and the thyristor.

The second question.

1--ϕ controlled bridge is operated from 220 v 50 Hz supply&the load resistive load R=10Ω.if the average output voltage is 40%of the maximum possible average output voltage, Calculate:

(a) the delay angle.

(b) the rms and average output current.

(c) the rating of each thyristor.

(d) the input power factor.

The third question .

A 3- ϕ half controlled bridge without free wheeling diode supplied from 3- ϕ Y connected 220 v 50 Hz is used to charge a battery of 163 v emf &has internal resistance of 2Ω .A dc filter is included in the output circuit to maintain the dc current virtually smooth .Find the firing angle(α) required to supply 12A to the battery ,then calculate:

a) the energy stored in the battery in one hour.

b) the rms and average SCR currents .

c) input power factor (pf)

d) the transformer utilization factor (TUF) .

e) Sketch considering commutation the waveforms of v_o , i_a , i_{D4} , v_{D4}

The fourth question

A 1-ϕ full converter is operated from 220 v ,50 Hz supply and uses symmetrical angle control .The load current with an average value of Ia is continous and has negligible ripplecontent. If the conduction angle is $\beta=2\pi/3$,calculate:

(a) the outputs v_{dc} & v_{rms}

(b) the harmonic factor(HF)of input current.

(c) the displacement factor.

(d) the input power factor.

The fifth question

Power transistor (BJT)has beta(β)=12, $v_{CE(sat)}$=1.2v, $v_{BE(sat)}$ =1.6V. The load resistance R_c=1.5Ω. the dc supply voltage is v_{cc} =40v&the input voltage to the base circuit is v_B =6v.If R_B=0.7Ω. Determine:

(a) the overdrive factor ODF.

(b) The forced β.

(c) The power loss in the transistor p_T .

Good Luck .

بسم الله الرحمن الرحيم

جامعة طنطا — امتحان: الفصل الدراسي الثاني

كلية الهندسة — الفرقة الثانية: قوى و آلات كهربية

قسم هندسة القوى والآلات الكهربية — المادة: هندسة القوى الكهربية (٣)

تاريخ الامتحان : ٢٨ / ٥ / ٢٠٠٧ — الزمن: ٣ ساعات

Answer the following questions:

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$\mathbf{C_1}= 0.0005 \angle 90°$ mho — $\mathbf{C_2}= 0.0008 \angle 90°$ mho

Find the **A, B, C** and **D** constants of the system. If the line delivers a load of 110.0 MW at 0.9 lagging power factor and 132.0 kV, draw the combined sending and receiving end power circle diagram and find: -

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i) Find the bus admittance matrix, $(\mathbf{Y_{bus}})$.

ii) Eliminate nodes **4 , 5** and **6** of the circuit of Figure **1** by matrix algebra, and draw the circuit described by the resulting matrix .

---

5) A 15000 KVA , 8.5KV three – phase generator has a subtransient reactance of 12 %. It is connected through a Δ-Y transformer to a high –voltage transmission line having a total series reactance of 80 Ω .At the load end of the line is a Y- Y step –down tranformer. Both transformer banks are composed of single –phase transformers connected for three- phase operation . Each of the three transformers composing each bank is rated 6667 KVA ,10-100 KV , with a reactance of 12 %. The load, represented as impedance is drawing 10000 KVA at 12.5 KV and 85 % power factor lagging . Draw the one-line diagram and mark base KV in the three parts of the system . Then draw the impedance digram showing all impedances in per unite . Choose a base of 10000 KVA ,12.5KV in the load circuit . Determine the voltage at the terminals of the generator.

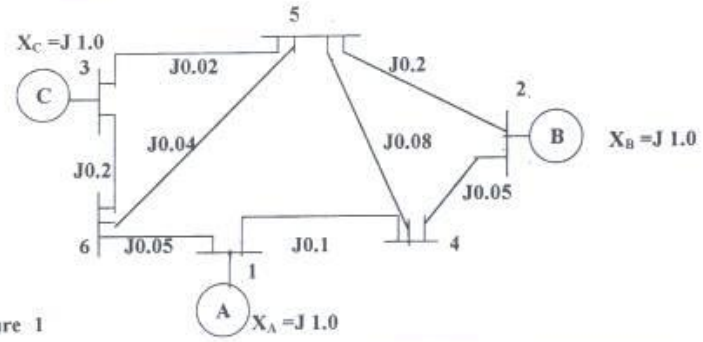

Figure 1

GOOD LUCK

جامعة طنطا
كلية الهندسة
قسم القوي الكهربائية

إقتصاد هندسي
الزمن: ٢ ساعة
التاريخ: ٢٥ يناير ٢٠٠٧

أجب على خمسة أسئلة مما يلي:

١- ما هو الدور الرائد للصناعات الصغيرة في المجتمع ، وكيف يمكن التفرقة بينها وبين الأحجام الصناعية الأخري ؟

٢- بين تأثير معدل الإنتاج للعمليات الصناعية (التشغيل) علي مستويات الربح والخسارة للمنشأة الصناعية ، مع توضيح ذلك بيانيا.

٣- إذا كان إجمالي المبيعات السنوية لمشروع صناعي ٢٥ مليون دولار سنويا ، فكم يقدر رأس ماله الثابت علما بان معدل الدوران (معامل رأس المال) هو ٣ بالنسبة للصناعة المثيلة.

٤- كم يبلغ قسط الإهلاك السنوي للأصول (معدات) بلغت تكلفتها الشرائية ٢٥ مليون دولار ، وتكلفة النقل والتركيب لها ٦ مليون دولار ، علما بأن عمر الأداء لهذه المعدات ١٠ سنوات ، وقيمة النفاية لها ٢٠% من إجمالي تكلفة الشراء والتركيب.

٥- مشروع صناعي قائم وصلت إيراداته السنوية (المبيعات) ٢٥ مليون دولار ، كما بلغت التكلفة الكلية للتشغيل ١٨ مليون دولار ، ما هو العائد البسيط علي إجمالي رأس المال المستثمر والمقدر بمبلغ ٣٥ مليون ريال ، وكذلك معدل العائد البسيط علي رأس المال المدفوع من جانب الشركاء والذي يمثل ٥٠% من إجمالي رأس المال المستثمر في المشروع والباقي قروض بنكية ، علما بأن المشروع يقوم بدفع ضريبة دخل مقدارها ٢٠ % علي أرباحه السنوية ، كما يقوم بدفع فوائد بنكية مقدارها مليون ونصف (١ر٥ مليون) دولار سنويا.

٦- كيف يمكن تقدير تكلفة المعدات بطريقة القياس ، وما هو شرط إستخدام هذه الطريقة؟ وماهي أهم البنود التي تستخدم لتقدير رأس المال المستثمر في المشروع الصناعي؟

جامعة طنطا
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قسم القوي الكهربائية

إقتصاد هندسي
الزمن: ٢ ساعة
التاريخ: ٢٥ يناير ٢٠٠٧

أجب على خمسة أسئلة مما يلي:

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٢- بين تأثير معدل الإنتاج للعمليات الصناعية (التشغيل) علي مستويات الربح والخسارة للمنشأة الصناعية ، مع توضيح ذلك بيانيا.

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الزمن: ٢ ساعة
التاريخ: ٢٥ يناير ٢٠٠٧

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جامعة طنطا	امتحان الفصل الدراسي الأول	المادة: هندسة ميكانيكية (لائحة جديدة)
كلية الهندسة	العام الجامعي ٢٠٠٦/٢٠٠٧	الفرقة: الثانية كهرباء (قوى)
		الزمن: ثلاث ساعات

أجب عن الأسئلة الآتية

السؤال الأول

أ- اشرح مع الرسم الفرق بين انتقال الحرارة بالتوصيل والحمل والإشعاع

ب- اذكر معادلة سريان الحرارة والمقاومة الحرارية من كل من الحالات الآتية :-
جدار مستوى - اسطوانة طويلة جوفاء - كرة جوفاء - سطح مصمت

جـ- موقد منزلي أجوف على شكل متوازي مستطيلات ذي أبعاد داخلية 76 cm x 61 cm x 46 cm والأبعاد الخارجية هي 81 cm x 66 cm x 51 cm . أوجد القدرة الداخلية للموقد بالوات اللازمة لحدوث حالة الاستقرار. تجاهل الحرارة المفقودة للأركان وحواف الموقد مع العلم أن درجة حرارة الجدران الداخلية والخارجية هي 204 °C ، 38 °C على التوالي وأن الجدران مصنوعة من مادة الاسبستوس .

السؤال الثاني

أ- اشرح مع الرسم التناظر الكهربي والهيدروليكي والحراري ؟

ب- استنتج معادلة انتقال الحرارة بالتوصيل خلال اسطوانات متحدة المركز ؟

جـ- لوح معدني رفيع يسري إلى أحد أسطحه فيضاً حرارياً مقداره $500\ W/m^2$ بينما يبث سطحه الآخر الحرارة بالإشعاع للوسط المحيط والذي درجة حرارته 10 °C . أوجد درجة حرارة هذا السطح معتبراً أنه سطح أسود .
(علماً بأن ثابت استيفان بولتزمان $5.67 \times 10^{-8}\ W/m^2\,K$)

السؤال الثالث

أ- اذكر الفرق بين السريان الطبقي والسريان المضطرب ؟ ثم اشرح مع الرسم تجربة رينولدز

ب- اشرح الأنواع المختلفة لانسياب الموائع ؟ ثم استنتج معادلة برنولي ؟

جـ- نافورة مياه قطرها 7.5 سم تتدفق منها المياه بسرعة 30 م/ث وصنعت لوحة منحنية تتغير اتجاهها 120° أوجد القوة المؤثرة بواسطة النافورة على اللوحة قيمة واتجاهاً. يمكن تجاهل قيمة الاحتكاك .

السؤال الرابع

أ- اشرح مع الرسم نظرية عمل مقياس الفنشوري لقياس التدفق للسوائل ؟

ب- اشرح مع الرسم المانومتر على شكل حرف U و المانومتر المائل مع ذكر الفرق بينهم ؟

جـ- توربين غازي يستخدم كشاحن مرحلة ديزل فإذا كان الإنثالبي عند الدخول 132 KJ/kg وسرعة الغازات 2.5 m/s والإنثالبي عند الخروج 80 KJ/kg وسرعة الغازات 1 m/s فإذا كان معدل السريان 0.2 kg/s احسب القدرة الناتجة من التربين (باعتبارها معزولة)

السؤال الخامس

أ- اشرح مع الرسم المضخة الطاردة المركزية ؟ ثم عرّف ظاهرة التكهف ؟

ب- اذكر الصيغة الرياضية للقانون الأول للديناميكا الحرارية ثم اشرح كيفية تطبيقه فى كل من الحالات الآتية :

المبادل الحرارى السطحى - المكيف - الضاغط - النظام المغلق

ج- اشرح مع الرسم ترتيب الاسطوانات فى محركات الاحتراق الداخلى ؟ ثم وضح خصائص كل نوع .

السؤال السادس

أ- اشرح مع الرسم قطاع فى اسطوانة محرك احتراق داخلى رباعى الأشواط وشكل كأس شوط ؟

ب- عرّف كل من :- نسبة الانضغاط - السعة الحجمية

القدرة النوعية - الكفاءة الحجمية

ج- محرك ديزل رباعى الأشواط ذو اسطوانة واحدة قطرها 140 mm وطول الشوط 140 mm رصدت له البيانات التالية اثناء اختباره

السرعة = 900 r.p.m	احسب
قوة الفرملة = 180 N	١- القدرة الفعالة
ذراع الفرملة = 600 mm	٢- الكفاءة الميكانيكية .
الضغط المتوسط الميانى = 7.8 bar	

بسم الله الرحمن الرحيم

جامعة طنطا — امتحان: الفصل الدراسي الأول

كلية الهندسة — الفرقة الثانية: قوى وآلات كهربية

قسم هندسة القوى والآلات الكهربية — المادة: أسس هندسة القوى الكهربية

تاريخ الامتحان : ١٨ / ١ / ٢٠٠٧ — الزمن: ٣ ساعات

Answer the following questions:

1-a)Define :-
i)Ferranti Effect
ii)Skin Effect
iii)The transposition cycle of the conductors

b) A three- phase transmission line 8 Km long is to deliver 6 Mw at 33 Kv (line) at the receiving end .The per - phase reactance of the line is 1 Ω per Km, and the power factor at the receiving end is 0.9 lagging. If the line voltage at the sending end is maintained at 34.7 Kv.The resistivity of copper is 1.7 μ Ω.Cm. Calculate :-
I) The size of the conductors, II) The efficiency of transmission line, and
III) The power factor at the sending end.

---

2) A single –circuit 3-phase 50 Hz transmission line, 100 miles long, has its conductors arranged at the corners of a triangle whose sides are 25, 20 and 15 ft in length, and the conductors are regularly transposed .The conductors are of diameter 0.5 inch and resistance 0.15 Ω per mile per conductor. If the line is delivering a full load of 100 MVA at a power factor of 0. 85 lagging and at 132 Kv. Calculate :-
i) The voltage, the current, and the power factor at the sending end.
ii) The efficiency of transmission line, and
iii) The percentage regulation.
Use the nominal Π– method.

3-a)Explain the main types of insulators.

b)) A string of suspension insulators consists of four units .The capacitance between each link pin and earth is one – tenth of the self - capacitance of a unit .The voltage between the line conductor and earth is 66 Kv .Find :-
I)The voltage distribution across each unit, and
II)The string efficiency.
Derive any relation used.

---

4) An overhead line has a span of 250 m and is supported at level ground. The conductor has a cross- section of 1.29 Cm^2 and weighs 1.13 Kg/m. The breaking strength of the conductor is 4220 Kg/ Cm^2 and factor of safety 2. Calculate the height of the conductor above the ground level at which it should be supported if a minimum clearance of 6.71 m is to be kept between the ground and the conductor. Assume wind pressure of the projected area is to be 40 Kg/m^2 Derive any relation used.

5-a) Compare the weights of copper used in case of single- phase, two- wire system , three- phase, three –wire system, and three –wire direct current system. Assume the same transmitted power , same maximum voltage between the conductors , same losses over a same distance , and the cross –sectional area of the neutral wire is same that of the outers.

b) A three –wire D.C. distributor PQ , 250 metres long , is supplied at end P at 400/200 V and is loaded as under :
Positive side : 20 A 150 metres from P , 30 A 250 metres from P
Negative side : 24 A 100 metres from P , 36 A 220 metres from P .
The resistance of each outer wire is 0.02 Ω per 100 metres and the cross – section of the middle wire is one – half that of the outer .
Find the voltage across each load point

6-a) Make a comparison between DC and AC distribution systems

b) A three – phase , four – wire system with 400 / 230 V is loaded as follows :-
i)25 H.P. three – phase induction motor having on efficiency of 90 % and lagging power factor 0.85,
ii) 20KW, three – phase load having a lagging power factor of 0.9 ,
iii) a single – phase load of 10 KW at unity power factor between R and N ,
iv) a single – phase load of 5 KW at 0.8 power factor lagging between B and N
Calculate the currents in all the four – wires of this three – phase , four – wire system .

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إقتصاد هندسي
الزمن : ٢ ساعة
التاريخ : ٢٥ يناير ٢٠٠٧

أجب على خمسة أسئلة مما يلي :

١- بين مع الشرح المكونات الرئيسية التي تدخل في تقدير اجمالي رأس المال الواجب استثماره في احد المشروعات الصناعية .

٢- يؤثر معدل التشغيل (الانتاج) في العمليات الصناعية على معدلات الربح و الخسارة لهذه العمليات الصناعية ، اشرح ذلك مع الايضاح بيانيا .

٣- تكلفة الشراء لمبدل حراري مساحته السطحية ١٠ قدم مربع هي ٣٠٠٠٠ دولار وذلك في عام ١٩٩٤ ، ما هي تكلفة الشراء لمبدل حراري مثيل مساحته السطحية ٢٠ قدم مربع في عام ٢٠٠٢ ؟
(معامل مارشال و سويفت لتكلفة المعدات هو ٩٩٤ لعام ١٩٩٤ و مقداره ١١٠٤ لعام ٢٠٠٢ ، كما ان قيمة المعامل الثابت س للمبدلات الحرارية هو ٠.٦)

٤- ماهي الوسائل المختلفة لتقدير أجمالي تكلفة المنتج ؟
و ماهو المقصود بكل من :
تكاليف الإنتاج المباشرة
تكاليف الإنتاج الثابتة
تكاليف الإنتاج الاضافية

٥- عرف ما يلي :
القيمة الدفترية للأصل
القيمة السوقية للأصل
قيمة الإحلال للأصل
و ماهي قيمة الأصل (معدة) بعد خمس سنوات من بدأ تشغيله علما بأن تكلفة الشراء بما فيها التركيب هي ٢٥٠٠٠٠ دولار و أن العمر المقدر لهذا الأصل هو عشر سنوات ؟

٦- إحسب القيمة المضافة السنوية ، و صافي القيمة المضافة السنوية لمشروع صناعي قائم يصل حجم مبيعاته ٧٥ مليون دولار سنويا ، و قيمة المواد الداخلة (أو المواد التي يشتريها المشروع من خارجه) هي ٣٠ مليون دولار ، كما أن قسط الإهلاك السنوي لهذا المشروع ٥ مليون دولار .

السـؤال الأول:-

وضح بالرسومات المتقنة وكافة البيانات على الرسم كلا مما يأتي:

أ- قطاع فى تربة منتظمة.

ب- التركيب الحبيبي للتربة الطينية و تربة الرمل والزلط.

السـؤال الثاني:-

أ- عرف التربة، وكيف تكونت؟

ب - أذكر ما تعرفه عن كل من: التربة النهرية – التربة العضوية.

ت- ماهى أهم الفروق بين التربة المتماسكة والتربة الغير متماسكة؟

ث- أذكر باختصار أهم أسباب تولد الاجهادات داخل التربة.

ج- المطلوب حساب قيمة الاجهادات الكلية المتولدة فى كابل كهربائى نتيجة لحمل مركز مقداره ١٠ طن يؤثر على سطح الأرض، اذا علمت أن الكابل يقع أفقيا على بعد ٥ أمتار من مكان تأثير الحمل وعلى عمق ٣ أمتار أسفل الحمل وأن وزن وحدة الحجوم للتربة الموجود بها الكابل هو ١,٨ طن / م^3

ملحوظة: $$\Delta\sigma_v = \frac{3P}{2\pi z^2}\left[\frac{1}{1+(r/z)^2}\right]^{5/2}$$

السـؤال الثالث:-

أ- عرف الأساس، وما هى أهم الشروط الواجب توافرها عند اختيار أساس أى منشأ؟

ب- أذكر مستعينا بالرسم أهم أنواع الأساسات السطحية، مع توضيح متى يتم استخدام كل نوع منها.

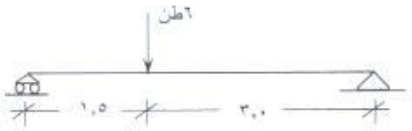
ت- مافائدة استخدام السملات لكل من الأساسات السطحية والأساسات العميقة؟

السـؤال الرابع:-

أ- وضح بالرسم نوعين من الأعضاء الانشائية المركبة مع توضيح الأعضاء الانشائية الأولية التى يتكون منها كل نوع.

ب- أذكر أنواع الأحمال التى يمكن أن تؤثر على المنشآت.

ت- للكمرة الموضحة بالشكل، المطلوب تحديد قيم ردود أفعال الركائز ثم رسم أشكال توضح قيم وتوزيع القوى الداخلية العمودية (N.F.D.)، وقوى القص (S.F.D.)، وقوى العزوم (B.M.D.) المتولدة داخل الكمرة نتيجة الحمل المركز المؤثر عليها علما بأن الأبعاد الموضحة بالأمتار.



أطيب الأمنيات بالنجاح والتفوق

جـــامعة طنـــطا　　امتحان الفصل الدراسي الأول ٢٠٠٦/٢٠٠٧

كـــلية الهندســـة　　الفرقة : الثانية كهرباء - قوى

المـــادة : الهندسة المدنية　　الزمن : ثلاث ساعات

السؤال الأول

أ- أذكر ما تعرفه عن كل من الآتي مع توضيح أجابتك بالرسم كلما أمكن :

الزاوية السمتية - زاوية الانحراف الرأسي - العدسة السالبة - الرويبر الحائطي - نقطة الدوران - خط النظر في تلسكوب ميزان القامة.

ب- المطلوب تصميم ورسم مقياس رسم تخطيطي ١ : ٦٠٠ يقرأ مباشرة إلى اقرب نصـــف ذراع معماري ثم بين عليه خطا طوله ٥٣,٥ ذراع معماري.

السؤال الثاني

يراد مد خط كهرباء ضغط عالي بين خمسة أبراج معدنية فإذا قيست المسافة الأفقية بين كل برجـين متتاليين من خريطة بمقياس رسم ١: ٥٠٠ فكانت مساوية ١٨,٦ سم وكـــانت الأبـــراج بنفـــس الارتفاع وسطح الأرض يميل بمعدل ١: ٦ فإذا علمت أن الترخيم في منتصف المسافة بـــين كـــل برجين = ٧,٢ متر أوجد طول الكابل الحقيقي الذي يجب صرفه من المخازن.

السؤال الثالث

أخذت القراءات الآتية بالأمتار في ميزانية أحريت في موقع كوبري علوي وكانت كما يلي:

٢,٣٣ - ٣,٢٢ - ١,٦٨ - ٢,١٦ - ٢,٥٤ - ٢,٥٧ - ١,٩٦ - ٣,١٤ - ٢,٢٣ - ٢,٧٨ - ٢,٦٥ - ٣,٤٨ - ٢,٥٩ - س - ١,٧٩.

فإذا علمت أن منسوب النقطة الخامسة = ١٠,٤٨ متر وأن الميزان نقل بعـــد القـــراءات الرابعـــة والسابعة والثانية عشر، وأن النقطة السادسة مأخوذة على كمرة الكوبري العلوي والقامة مقلوبـــة فالمطلوب:

١- إيجاد مناسيب النقط المختلفة في جدول ميزانية كامل

٢- عمل جميع التحقيقات الحسابية

٣- إيجاد مقدار القراءة (س) إذا علمت أن هذه القراءة فوق نقطة منسوبها = ٧,١٨ م

مع تمنياتي بالتوفيق

د. حـــافظ عبـــاس عفيـــفي

بسم الله الرحمن الرحيم

جامعة طنطا
كلية الهندسة
قسم هندسة القوى والآلات الكهربية
تاريخ الامتحان : ٢٨ / ١٢ / ٢٠٠٦

امتحان: الفصل الدراسي الأول
الفرقة الثانية: قوى وآلات كهربية
المادة: هندسة القوى الكهربية (١)
الزمن: ٣ ساعات

Answer the following questions:

1-a)Define -
i)Ferranti Effect .
ii)Skin Effect .
iii)The transposition cycle of the conductors .

b) A short three- phase transmission line delivers a balanced load of 250 A at a power factor of 0.9 lagging .The impedance per conductor is (0.25+j1.0) ohm .Calculate the sending-end line voltage necessary to maintain the efficiency of transmission at 95 per cent .

---

2) A single –circuit 3-phase 50 Hz transmission line, 100 miles long, has its conductors arranged at the corners of a triangle whose sides are 24, 20 and 10 ft in length, and the conductors are regularly transposed. The conductors are of diameter 0.55 inch and resistance 0.15 Ω per mile per conductor. If the line is delivering a full load of 90 MVA at a power factor of 0. 8 lagging and at 132 Kv. Calculate -
i) The voltage, the current, and the power factor at the sending end.
ii) The efficiency of transmission line, and
iii) The percentage regulation.
Use the nominal T– method.

3-a)Explain the main types of insulators.

b) The bus – bar conductor of a sub – station are supported by post insulators consisting each of three pin insulators fixed one on the top of the other . The voltage across the lowest insulator is 14.82 KV and that across the next is 12.26 KV .Assume the system as three phase , three – wire .Find the voltage between the bus – bars . Calculate the string efficiency, derive any formula used.

---

4) The conductor of 132 KV line has a diameter 2.1 cm and weight 0.8 kg/ meter . The ultimate strength being 10000 kg .Calculate the height above ground at which the conductors with a span of 300 meters should be supported , the factor of safety being 2 . Wind pressure is 100 kg/m^2 . Ground clearance required is 6.1 meters . Find out the change in the height of conductor if there is an ice coating of 1.0 cm . Derive any formula used .

5-a) Compare the weights of copper used in case of single- phase, two- wire system , three- phase, four –wire system, and three –wire direct current system. Assume the same transmitted power , same maximum voltage between the conductors , same losses over a same distance , and the cross –sectional area of the neutral wire is same that of the outers .

b) The load on a D C three –wire system with 400V between outers consists of lighting current of 2000 A on the positive side and 1500 A on the negative side while motors connected across of the outers absorb 500 KW. If at this loading, the balancer machines have each a loss of 7.5 KW. Calculate the current in the neutral, the current in each armature of the balancer set, the total current supplied by the generator and the KW loading of each balancer set.

6-a) Make a comparison between DC and AC distribution systems.

b) A three – phase , four – wire system with 400 / 230 V is loaded as follows :-
i)20 H.P three – phase induction motor having on efficiency of 90 % and lagging power factor 0.8,
ii) 25KW, three – phase load having a lagging power factor of 0.9 ,
iii) a single – phase load of 8 KW at 0.85 power factor lagging between R and N ,
iv) a single – phase load of 5 KW at unity power factor between Y and N ,
v) a single – phase load of 3 KW at unity power factor between B and N .
Calculate the currents in all the four – wires of this three – phase , four – wire system .

GOOD LUCK

TANTA UNIVERSITY
Faculty of Engineering
2nd Year (Dept. Electric Power & Machines Eng.)

Course: Energy Co
Final Exam. 2005-2006
Time: 3 hours

ملاحظات هامة: لاتعوض عن أي من μ_o و π بقيمتها (المعروفة) بل اترك الأجوبة بدلالتهما
افرض رموزا لو قيما واقعية لأي معطيات لم تذكر و تحتاجها
وضح اجابتك بأشكال توضيحية مرسومة يدويا ومعادلات كلما أمكن ذلك

Question 1

a Sketch neatly two-pole doubly excited rotary electromechanical en conversion systems with salient rotor and non-salient stator and coil axes displaced by an angle θ. Neglecting the leakage flux, sketch the flux paths different rotor position and appropriate المناسبة excitation to deter expressions for self and mutual inductances with reasoning مع ذكر الحجج

b Derive an expression for the energy stored in a stationary coil with nonli magnetic circuit in terms of flux density and magnetic field intensity. H show that the area of the first quadrant of the hysteresis loop is proportion the hysteresis energy loss during the period of that first quadrant; find constant of proportionality.

c Derive an expression for the energy stored in a coil with linear magn circuit in terms of inductance.

d Derive an expression for the electromagnetic force in a doubly- exc magnetically- linear translational system in terms of inductances, currents the position x.

e Give a logical or a mathematical explanation for the negative sign in Lenz'l

f Derive an expression for the mmf that results from a balanced two-ph winding excited by balanced two-phase currents in terms of position and ti Draw the expression for two instants and hence deduce استنتج the speed of mmf.

g Draw mass and energy flow diagram for fossil fuel combustion..

h Aided with illustration the principle of hydroelectric power generating pla using tidal basins.

i Sketch expanded view of a flat-plate solar collector.

Questions 2

A 2-pole motor has a single winding in the each of the stator and rotor. θ angle between the magnetic axis of the stator winding (named a) and the rotor w (named f). The self and mutual inductances of the two windings are: $L_{aa}=L_0-L_2$ c $L_{ff} = L_r$ (i.e. constant); $M_{af} = M \cos\theta_0$, where L_0, L_2, L_{ff}, L_r and M are p constants. The rotor is revolving at a speed ω so that its instantaneous angular p is given by $\theta = \omega t - \delta$ where δ is a small phase angle describing the position of the r $t = 0$.

a) If the rotor winding is excited by a constant d-c I_f and the stator winding ca current $i_a(t) = \sqrt{2}\, I_a \cos\omega t$, derive an expression for the average electromagnetic t

b) If the rotor and stator windings are excited by a constant d-c I_f and respectively, derive an expression for the average electromagnetic torque.

Question 3

Fig. P3 shows a section of a machine having two identical stator windings a bb' in quadrature. The self inductances L_{aa}, L_{bb} and L_{ff} are constants. The

inductances between the rotor and the stator windings are function of the angular position of the rotor as follows: $M_{af} = M \cos\theta_0$; $M_{bf} = M \sin\theta_0 + b$ and $M_{ab} = 0$, where M and b are positive constants. The rotor is revolving at a speed ω so that its instantaneous angular position is given by $\theta = \omega t - \delta$ where δ is a small phase angle describing the position of the rotor at $t = 0$. If the rotor winding is excited by a constant d-c I_f and the stator windings carried balanced two-phase currents $i_a(t) = \sqrt{2}\, I_s \cos\omega t$ and $i_b(t) = \sqrt{2}\, I_s \cos\omega t$, derive an expression for the instantaneous voltages of the stator phases a and b

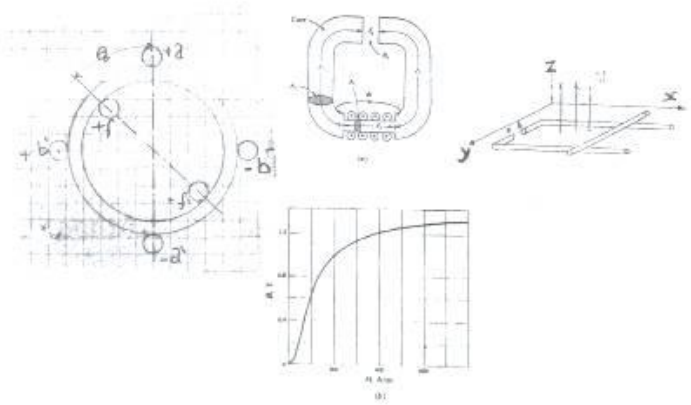
Question 4

A composite magnetic circuit of varying cross section is shown in Fig. P4 (a); the iron portion has the B-H characteristic of accompanied Figure (b). Given:: $l_1 = 2\, l_2 = \gamma$ cm; $A_1 = 2A_2 = \alpha$ cm^2 ; $l_g = 0.005\, l_1$; leakage flux is negligible. Calculate the energy stored and the coenergy in the air-gap and in iron for an air- gap flux density of 0.3 T (employ a straight line approximation).

Question 5

The rails shown in Fig. P5 are separated 5 Cm and extended 2.4 m from the gap ab. If $B = 0.4x\, a_z$ T and the position of the sliding bar is given by : $x = 5.4\, t - 3t^2$ m (a) Find the magnitude of V_{ab} when x = 1m. (b) If ab is shorted and the circuit resistance is 1 Ohm, derive an expression for the instantaneous mechanical power. Neglect any change in the magnetic field caused by the flow of electric current.

Fig. P3 Fig. P4 Fig. P5



END OF EXAM **LUCK◄GOOD►BYE**

بسم الله الرحمن الرحيم

جامعة طنطا
كلية الهندسة
قسم هندسة القوي والآلات الكهربية
تاريخ الامتحان : ٢١ / ١ / ٢٠٠٨

امتحان: الفصل الدراسي الأول
الفرقة الثانية: قوي وآلات كهربية
المادة: أسس هندسة القوي الكهربية
الزمن: ٣ ساعات

Answer the following questions:

1-a) Define:-
I) Ferranti Effect.
II) Skin Effect.
III) The transposition cycle of the conductors .

b) A short three- phase transmission line delivers a balanced load of 200 A at a power factor of 0.8 lagging .The impedance per conductor is (0.75+j1.0) ohm . Calculate the sending- end line voltage necessary to maintain the efficiency of transmission line at 90 per cent .

---

2)A single –circuit 3-phase 50 Hz transmission line, 100 miles long, has its conductors arranged at the corners of a triangle whose sides are 25, 20 and 15 ft in length, and the conductors are regularly transposed. The conductors are of diameter 0.5 inch and resistance 0.15 Ω per mile per conductor. If the line is delivering a full load of 100 MVA at a power factor of 0.9 lagging and at 132 Kv. Calculate :-
I) The voltage, the current, and the power factor at the sending end.
II) The efficiency of transmission line, and
III) The percentage regulation.
Use the nominal T– method.

3-a)Explain the main types of insulators.

b)A string of overhead suspension insulators consists of four units. The capacitance between units is 7.0 times of the capacitance between each unit and earthed frame work. If the maximum peak voltage per unit is not exceed by 25 KV. Find the maximum voltage which the string of insulator can with stand. Calculate the string efficiency, derive any formula used.

---

4) An overhead transmission line conductor having a parabolic configuration weight.1.6 kg/ m length , area of cross- section of 2.2 cm^2 and an ultimate strength of 8000 kg/cm^2 . When erected between supports 500 meters apart and having 15 meters difference in heights . Determine the vertical sag from the taller of the two supports which must be allowed so that the factor of safety shall be 2 with the wire loaded due to 1 kg of ice per meter and wind pressure is 80 kg/m^2 .
Derive any relation used.

5-a) Make a comparison between DC and AC distribution systems.

b)The load on a D.C. three –wire system with 400V between outers consists of lighting current of 2000 A on the positive side and 1500 A on the negative side while motors connected across of the outers absorb 500 KW. If at this loading, the balancer machines have each a loss of 7.5 KW. Calculate the current in the neutral, the current in each armature of the balancer set, the total current supplied by the generator and the KW loading of each balancer set.

---

6) A single – phase distributor, one Km long has resistance and reactance per conductor of 0.05 Ω and 0.1 Ω respectively. At the far end, the voltage $V_B = 250$ V and the current is 120 A at a power factor of 0.8 lagging.
At the mid – point A of the distributor, a current of 100 A is tapped at a power factor of 0.6 lagging with reference to the voltage V_A at the mid –point.
Calculate the supply voltage V_S for the distributor, the phase angle between V_S and V_B and the distributor's efficiency.

GOOD LUCK

جـــامعة طنـــطا
كـــلية الهندســـة
المـــادة : الهندسة المدنية

الفصل الدراسي الأول ٢٠٠٨/٢٠٠٧
الفرقة : الثانية كهرباء - قوى
الزمن : ثلاث ساعات

أجب على جميع الأسئلة الآتية

السؤال الأول

أ- أذكر العوامل التي يتوقف عليها إختيار مقياس رسم الخريطة.

ب- المطلوب تصميم ورسم مقياس رسم تخطيطي ١ : ٨٠٠ يقرأ بدقة ٠,١٢٥ قصبة - ثم بين خطاً طوله ٢٨,٦٢٥ قصبة على هذا المقياس.

السؤال الثاني

أخذت القراءات الآتية في ميزانيـــة فكانـــت ٢,١٤ - ١,٦٧ - ٢,٢٨ - (١,٢٥) - ٣,٦٧ - ١,٤٤ - (٣,٧٦) - ١,٨٦ - (١,١٧) - ٣,٦٤ - (٢,١١) - س - ٢,٦٧ - ١,٢٢ .

أوجـــد في جدول ميزانية كامـــل منـــاسيب النقط المختلفة علماً بأن منسوب النقطـــــة الأولى = ٣,٦٨- متر وأن القراءات بين الأقواس مؤخرات والقراءة عند النقطة الرابعة سقف قبو أحـــدث والقامة مقلوبة. أوجد أيضاً القراءة س حتى يكون منسوب هذه النقطة مســـاوياً منـــسوب النقطـــة الخامسة ثم تحقق من صحة العمل الحسابي بجميع معادلات التحقيق.

السؤال الثالث

شريط طوله الأسمي ٥٠ متر تحت معايرته وهو مستند على كامل طوله في درجة حرارة ٦٨ فهرنهيت فوجد أن وزن المتر الطولي منه = ٠,٠٢٦ كجم وطوله الحقيقي يساوي ٤٩,٨٤ متر فإذا اســـتخدم هذا الشريط لقياس خط على أرض منحدرة بمعدل ١٠ % في نفس درجة حرارة المعـــايرة وكـــان الطول المقاس للخط ٤٤٦,٧٨ متر وكان الشريط مرتكزا عند طرفيه فقط لجميع طرحات القيـــاس وكان الشد عليه مساويا ١٢ كجم - أوجد الطول الصحيح للخط المقاس.

السؤال الرابع

أ- ما هي الخواص الهندسية للتربة ؟ عرف كل منها.

ب- اذا كان هناك حمل رأسي قيمته ٤٠طن يرتكز على قاعدة خرسانية مربعة ذات أبعاد ٢ متر عرض و ٣ متر طول. أحسب التغير في الاجهاد الرأسي على التربة عند نقطة تقـــع تحـــت مركز القاعدة الخرسانية على عمق ٤ متر تحت سطح القاعدة الخرسانية.

ت- ما هي العوامل المختلفة التي تؤثر في خاصية انضغاطية التربة ؟

ث- اشرح باختصار مع الرسم الأنواع المختلفة للأساسات السطحية والأساســـات العميقـــة ؟ وكيف يتم اختيار كل نوع منها ؟

مع تمنياتنا بالتوفيق أ.م.د / مروان المغاوري شاهين أ.م.د / حافظ عباس عفيفي

رياضة   اتصالات + قوى (جديد - قديم)

Tanta University – Faculty of Engineering
Department of Physics and Mathematics
Final Examination -Second Year (Comuni.& Power Elec.)

Subject: Mathematics
Date : 12 | 1 | 2008
Time : 3 Hours

Answer the following Questions

1-a) If a car is traveling along a straight road with constant speed $v = b_1$ [m/sec.] , its position y [m] at time t [sec.] is $y = b_0 + b_1 t$. Suppose that measurements are

t	0	3	5	8	10
y	200	230	240	270	290

Fit a straight line to these data by least squares and estimate from it the speed .

1-b) Given the data

x	0.1	0.2	0.3	0.4	0.5
y = f (x)	0.70010	0.4016	0.1081	- 0.1744	- 0 . 4375

Find an approximate value of the zero of f (x) between 0.3 and 0.4

1-c) Obtain the estimate of the missing figures in the following table

x	2 .0	2 .1	2.2	2.3	2.4	2.5	2.6
f(x)	0.135	- -	0.111	0.100	- -	0.082	0.074

2-a) Evaluate $I = \int_0^1 e^{-x^2} dx$ by Simpson's Rule with $n = 10$

2-b) Find the value of y at $x = 2.6$ by using modified Euler's Methods with $h = 0.2$, if $y = \sqrt{x^2 + 4y^2}$, $y(2.2) = 1.5$

2-c) Apply Runge – Kutta Method to find an approximate value of y when $x = 0.2$ given that

$$\frac{dy}{dx} = x + y \quad , y = 1 \text{ when } x = 0 \text{ (take } h = 0.1)$$

2-d) Compute numerically the first two rows of the solution of the wave equation

$$\frac{\partial^2 u}{\partial t^2} = 4\frac{\partial^2 u}{\partial x^2} \qquad , 0 \le x \le 1 \quad , t \ge 0$$

with the boundary and initial conditions

$$u(0,t) = u(1,t) = 0$$

$$u(x,0) = \sin \pi x \quad , \frac{\partial u}{\partial t}(x,0) = 0$$

جامعة صنعاء	اختبار الفصل الدراسي الأول	الفرقة: الثانية كهرباء (قديم) لائحة جديدة
كلية الهندسة	العام 2007 / 2008	المادة: هندسة ميكانيكية
	يناير 2008	الزمن: ثلاث ساعات

أجب عن الأسئلة الآتية :- استخدم الرسم كلما أمكن ذلك

السؤال الأول

أ- استنتج معادلة برنولي لأنبوب سريان سائل مثالي مستقر؟ ثم اشرح كيف تكون هذه المعادلة لسريان مستقر لسائل حقيقي موضحاً الإجابة بالرسم؟

ب- اشرح التمثيل الهندسي لمعادلة برنولي؟

ج- اذكر ما المقصود بـ :- 1- الميل الهيدروليكي 2- الميل البيزومتري 3- الدوامة الحرة والدائرية المغلقة؟

د- يعطى توزيع السرعة لتدفق طبقي (لزج) في أنبوب دائري بالمعادلة $V = V_m\left[1 - \frac{r^2}{R^2}\right]$

حيث V_m هي السرعة عند محور الأنبوب، R هي نصف قطر الأنبوب

r هي المسافة نصف قطرية من محور الأنبوب.

1- أوجد السرعة المتوسطة بدلالة V_m

2- أوجد النسبة بين الطاقة الحركية الحقيقية إلى الطاقة الحركية محسوبة على أساس السرعة المتوسطة

3- أوجد النسبة بين معدل تغير كمية الحركة الحقيقية إلى معدل تغير كمية الحركة محسوبة على أساس السرعة المتوسطة

السؤال الثاني

أ- اشرح مع الرسم الهدف الأساسي لاستخدام المضخات؟ ثم اشرح مع الرسم أيضاً المضخة الطاردة المركزية؟ ثم عرف ظاهرة التكهف في المضخات؟

ب- اشرح مع الرسم نظرية عمل كل من U- table manometer ، The inclined table manometer

ج- استنتج الصيغة الرياضية للقانون الأول للديناميكا الحرارية؟ ثم اشرح كيف يمكن تطبيقه على 1- المبرد (الرادياتير) 2- المكيف أو المروحة

د- محرك حراري ينتج شغل ميكانيكي بمعدل 75 kW يستقبل المحرك المادة العاملة بطاقة داخلية مقدارها 1500 KJ/kg وطاقة الانسياب المصاحبة 176 KJ/kg، فإذا كان معدل انسياب المادة العاملة خلال المحرك 1050 kg/hr وكانت طاقة الانسياب عند الخروج 256 KJ/kg ومعدل فقد الحرارة من المحرك 3500 KJ/min.

احسب الطاقة الداخلية للمادة العاملة عند الخروج بوحدات الـ kW.

السؤال الثالث

أ- اشرح مع الرسم نظام منع اسطوانة محرك احتراق داخلي :-

1- رباعي الأشواط 2- ثنائي الأشواط موضحاً وظيفة كل جزء

ب- اذكر سبعة مزايا بين محرك البنزين ومحرك الديزل ؟

جـ- اذكر العوامل التي تؤثر على القدرة القصوى للمحرك ؟

د- عرف ما يلي :- نسبة الانضغاط - الكفاءة الحجمية - الضغط المتوسط البياني - القدرة النوعية

هـ- محرك اشتعال بالضغط (ديزل) رباعي الاشواط يدور بسرعة 800 r.p.m ويستهلك 113 gm من الوقود في 4 min ويعطي عزم مقداره 80 N.m فإذا كان المحرك ذو اسطوانة واحدة قطرها 125 mm وطول الشوط 135 mm والقيمة الحرارية للوقود المستخدم 42000 kJ/kg . احسب :-

1- القدرة الفعالة 2- الضغط المتوسط الفعال 3- المعدل النوعي الفعال لاستهلاك الوقود 4- الكفاءة الحرارية الفعالة 5- السرعة المتوسطة للمكبس .

السؤال الرابع

أ- اذكر ما تعرفه عن صيانة دورة الوقود من محرك الديزل ؟

ب- اشرح مع الرسم التناظر الكهربي والهيدروليكي والحراري ؟

جـ- استنتج معادلة التوصيل الحراري في الحالات الآتية :-

أ- خلال جدار اسطوانات متحدة المركز ب- المجسم كروي مجوف كرة جوفاء

د- اشرح مع الرسم والتفصيل تجربة عملية لقياس معاملات الأداء لمحرك احتراق داخلي ؟

هـ- اشرح كيف يطبق القانون الأول للديناميكا الحرارية على النظام المفتوح والنظام المغلق ؟ اعط أمثلة لذلك

و- استنتج معادلة انتقال الحرارة بالإشعاع بين سطحين ؟

ي- موقد منزلي أجوف على شكل متوازي مستطيلات أبعاده هي :-

أبعاده الداخلية 80 cm x 60 cm x 50 cm

أبعاده الخارجية 85 cm x 65 cm x 55 cm

أوجد القدرة الداخلية للموقد بالوات اللازمة لإحداث حالة الاستقرار . تجاهل الحرارة المفقودة لأركان وحواف الموقد مع العلم أن درجة حرارة الجدران الداخلية والخارجية هي 200 °م ، 40 °م على التوالي وأن الجدران مصنوعة من مادة الاسبستوس . الموصلية الحرارية له 0.166 W/(m. K)

TANTA UNIVERSITY
Faculty of Engineering
Power Engineering & Electric Machines Department

Course	: Electromagnetic fields	**Exam**	: Final
Code	: EPM2142	**Time**	: 3 Hours
Year	: 2nd year Electronics & Communications	**Date**	: 21 / 1 / 2007

QUESTIONS ARE IN TWO PAGES

ANSWER THE FOLLOWING QUESTIONS:

Question(1)

a) Aided with clear sketches, write down the mathematical equations for the following terms:
   i) Gauss's law
   ii) Divergence theorem in spherical coordinates.

b) Derive an expression of the potential difference between two points A at a distance r_A and point B at a distance r_B from a point charge Q.

c) A line is located in free space on the line y = 1, z = 2 and it has a uniform line charge density ρ_l = 12 nC/m, determine:
   i) The electric field intensity **E** at point A(4,-2,3).
   ii) The value of a point charge Q located at point B(-2,4,1) to cause E_y to be equal zero at point A.

Question(2)

a) Draw two dimensional flux lines due a positive charge + Q and a nearby negative charge – Q.

b) Derive the two characteristics of the relationship between potential difference V and electric field intensity E at any point. Also write down the voltage gradient equation in spherical coordinates.

c) Find the surface charge density induced at point A(2,5,0) on the conducting plane z = 0 if there is a line charge of 30 nC/m located at x = 0, z = 3.

Question(3)

a) Write down Maxwell's equations in its point form for static fields, defining each term used.

b) Using Ampere's circuital law derive a mathematical expressions for the magnetic field intensity **H** from $\rho = 0$ to $\rho = \infty$ of an infinitely long coaxial transmission line carrying a uniformly distributed total conductor current I in the inner solid conductor and – I in the outer hollow conductor, given that the inner solid conductor radius is h and the hollow outside conductor inner radius is b and its outer radius is c.
Sketch H versus ρ from 0 to ∞.

c) Two parallel plates of a capacitor spaced by three different dielectric materials with relative permittivity 5, 4, 2 and thickness 2, 3, 1 mm respectively. If each plate has an area of 4 cm^2 and the total applied voltage is 500 V, calculate:
   i) The total capacitance.
   ii) The electric field intensity in each dielectric material.
   iii) The voltage across each dielectric material.
   iv) The energy stored in each dielectric material.

Question(4)

a) Aided with clear sketches, derive expressions that determine the perfect dielectric material properties at the surface between two dielectric materials when they placed in an external electric field using the boundary conditions.

b) Derive a mathematical expression for self inductance of two parallel conductors.

c) Calculate the force produced on a square loop ABCD carrying current of 2 mA in $z = 0$ plane due to a current carrying conductor of 15 A placed in the y axis ($z = 0$ and $x = 0$), where the coordinates of square loop are: A(1,0,0), B(3,0,0), C(3,2,0), and D(1,2,0).

Good Luck

Prof. M.A.El-Khazendar

TANTA UNIVERSITY — Course: Energy Conversion
Faculty of Engineering | Final Exam. Jan. 2007-2008] New/old Curriculum
2nd Year (Dept. Electric Power & Machines Eng.) Time: 3 hours

ملاحظات هامة: لاتعوض عن أي من μ_o و π بقيمتها (المعروفة) بل اترك الأجوبة بدلالتهما كلما أمكن ذلك
افرض رموزا أو قيما واقعية لأي معطيات لم تذكر و تحتاجها
وضح اجابتك بأشكال توضيحية مرسومة يدويا ومعادلات كلما أمكن ذلك

Attempt all questions

من فضلك لاحظ درجات الأسئلة

Question 1

A linear magnetic system of two coils is shown in shown in Fig. 1. $N_1 = N_2 = \alpha$ turns, $g_1 = 2g_2 = \beta$ mm, and $A = \gamma$ mm^2. In terms of α, β, γ and others, determine (a) The self and mutual inductances (15 points) (b) the energy stored in the system when both coils are excited. (4 points)

Question 2

The machine shown in the Fig. 2 has three concentrated open-circuited stator coils each of T turns. The coils are arranged symmetrically around the stator. The poles of the rotors are so shaped that the flux distribution around the stator periphery due to the rotor mmf is sinusoidal. The total flux produced by the rotor current is ϕ wb, and the rotor is driven at constant N rpm.

a) Derive expression for: (i) the rotor constant angular velocity ii) β as a function of time t. (2 points)

b) For the direction of rotation in the figure and in terms of T, N, ϕ, t and others, derive expressions for (i) $\lambda_{a\text{-}a'}$: the flux linkage of coil a-a' and (ii) $e_{a\text{-}a'}$: the instantaneous emf induced in it. (12 points)

c) Write expressions for $e_{b\text{-}b'}$ and $e_{c\text{-}c'}$ the instantaneous values of the emf's induced in coils c-c' and b-b' respectively. (2 points)

Question 3

The electrical circuit of a doubly excited cylindrical machine has similar winding on stator and rotor is shown in Fig. 3. The electrical parameters are: stator winding resistance R_s; stator winding self inductance L_{ss}; rotor winding resistance R_r; rotor winding self inductance L_{rr} and mutual inductance L_{sr}.

a) Determine the average torque produced at a rotor angle of 45° when the machine is employed as an actuator with its two windings in series in series, as indicated in the figure and excited from (i)a dc source of 10 volt (ii) an ac source of 115 volt, 60-Hz.

b) If the stator were excited from a 60-Hz, and the rotor from a 25-Hz source, at what speed or speeds would the machine be capable of energy conversion? (22 points)

Question 4

a) Explain, with illustration diagram, domestic utilization of solar heat energy. (10 points)

b) Aided with illu ıtion, use the approach refereed to in lectures as approach 2 (i.e. representing the phase mmf by a spatial vector) to find the resultant mmf produced by symmetrical three-phase windings supplied by balanced three-phase currents. (10 points)

c) Given for a wind mill that: Output Power = $2A\rho(V - v)^2 v$ *and* Input power = $0.5 A\rho V^3$ where V is the entering wind velocity, v is the exit wind velocity, ρ is the air density and A is the disc area, derive an expression for the output power at maximum efficiency _____. Comment on the results in view of the maximum wind speed at which the mill is designed. (6 points)

d) Draw neatly a figure that shows a cross section of the magnetic system of a four-pole direct current machine illustrating the flux-paths. (7 points)

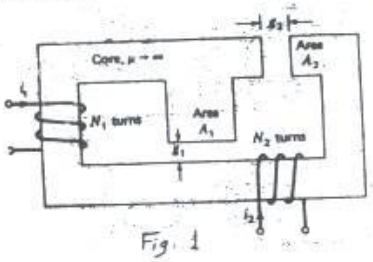


Fig. 1

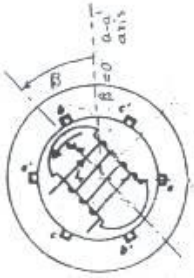


Fig. 2

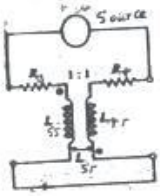


Fig. 3

END OF EXAM LUCK ◄GOOD► BYE

TANTA UNIVERSITY

Faculty of Engineering

Power Engineering and Electrical Machines Department

Course	: Electromagnetic Fields	**Exam**	: Final
Code	: EPM2104	**Time**	: 3 Hours
Year	: 2nd	**Department.**	: Power Engineering and Electrical Machines
Date	: 21 / 1 / 2009		

ANSWER ALL QUESTIONS

Question(1) *(18 Marks, a) = 6 Marks and b) = 12 Marks)*

a) With full definitions of all terms used, write down the equations of:
- i) Lorentz force equation.
- ii) Maxwell's equations in its integral form.

b) In free space, a point charge $Q_1 = 10$ nC is located at $P_1(0,4,0)$ and another point charge $Q_2 = 20$ nC is located at $P_2(0,0,4)$.
- i) Find the electric field intensity at the origin.
- ii) Where should a point charge = 30 nC be located so that the electric field intensity at the origin equals zero.

Question(2) *(20 Marks, a) = 8 Marks and b) = 12 Marks)*

a) Derive an equation of the capacitance of two charged concentric spheres, the radius of the inner and outer spheres are a and b respectively. The inner sphere has a charge Q and the outer sphere has a charge – Q.

b) Given the potential field $V = 60\ x^2\ y\ z + 30\ y^2$ V in free space, evaluate at P(2,1,5):
- i) The magnitude and direction of the electric field intensity.
- ii) The electric flux density.
- iii) The absolute potential.
- iv) The volume charge density.

Question(3) *(24 Marks, a) = 10 Marks and b) = 14 Marks)*

a) Using Ampere's circuital law derive a mathematical expression for the magnetic field intensity H from $\rho = 0$ to $\rho = \infty$ of an infinitely long coaxial transmission line carrying a uniformly distributed total conductor current I in the inner solid conductor and – I in the outer hollow conductor, given that the inner solid conductor radius is h and the hollow outside conductor inner radius is b and its outer radius is c. Sketch H versus ρ from 0 to ∞.

b) Two spherical concentric conductors with the inner spherical conductor is solid and has radius a and its voltage is V_1 . The outer spherical conductor has inner radius b and outer radius c and it has a voltage V_2.
Find the charges Q_1 and Q_2 for the following conditions:
- i) The two conductors are isolated.
- ii) Inner conductor is grounded.
- iii) Outer conductor is grounded.
- iv) The inner conductor is not charged.

Question(4) *(23 Marks, a) = 6 Marks and b) = 17 Marks)*

a) Derive the self inductance per a unit length of an infinite length conductor having a radius h.

b) Calculate the force produced on a square loop (ABCD) carrying a current of 5 mA in $z = 0$ plane due to a current carrying conductor of 10 A placed in the y axis ($z = 0$ and $x = 0$), where the coordinates of the square loop are: A(1,1,0), B(4,1,0), C(4,5,0), and D(4,5,0).

الفرقة الثانية هندسة القوى الكهربية جديد قوى كهربية (١)

Tanta university **Faculty of engineering** **Electrical Power and Machine Dept.** **A course of Power System (1)**	**Final Term Exam** **2-nd Year** **2008-2009** **Allowable Time: 3 H**

Solve The Following Questions

Question 1 (20 Marks)

a) Derive an expression of line inductance for three phase transmission line with an unequal spacing.

b) Three-phase double circuit are arranged as shown in Figure (1). If the diameter of each conductor is 5 cm, find capacitive reactance to neutral and the charging current per km per phase at 220 kV and 50 Hz, assuming that the line is regularly transposed.

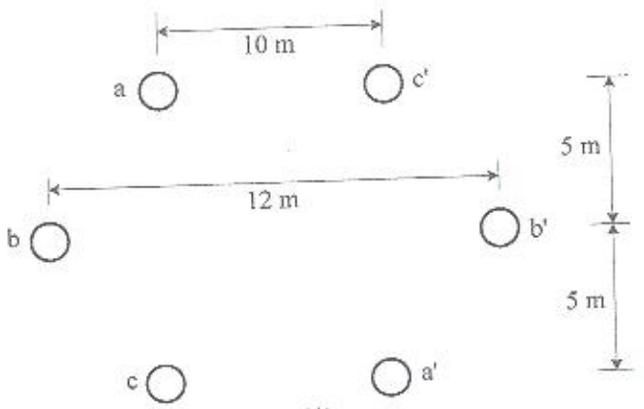


Figure (1)

Question 2 (25 Marks)

a) prove that the long transmission line model is:

$$\begin{bmatrix} V_s \\ I_s \end{bmatrix} = \begin{bmatrix} \cosh \gamma l & Z_C \sinh \gamma l \\ \frac{1}{Z_C} \sinh \gamma l & \cosh \gamma l \end{bmatrix} \begin{bmatrix} V_r \\ I_r \end{bmatrix}$$

b) A balanced 3-phase overhead transmission line has a total series impedance per phase of $200\angle 80^0\,\Omega$/phase and a total shunt admittance of $0.0013\angle 90^0\,\Omega^{-1}$/phase. The line delivers a load of 80 MW at 0.8 lagging power factor and 220 kV. Calculate: (i) the ABCD for T-model representation; (ii) the sending end voltage, current and power factor of the line; (iii) the line efficiency and line voltage regulation.

Question 3 (20 Marks)

a) Compare between aluminum and copper conductors.

b) An overhead line is supported between two towers 200 m apart having a difference in their levels equal to 10 m. The conductor diameter is 2 cm and weight of 2.3 kg/cm. **Calculate** the position of minimum point of conductor from each tower if the wind pressure is 57.5 kg/cm^2 of projected area and a factor of safety is 4. The maximum tensile strength of copper is 4220 kg/cm^2

Question 4 (25 Marks)

a) (i) **What are** the main types of distribution systems according to scheme of connections?

(ii) **What are** the main methods used to improve string insulators efficiency?

b) Define the following terms: (i) Flashover voltage; (ii) Puncture voltage

c) A DC ring distributor shown in Figure (2) is fed at point A from 250 V supply. The resistances of the various sections (go and return) are indicated in Figure (2). **Determine**: (i) the current in each distributor sections; (ii) the load voltages; (iii) the distributor efficiency.

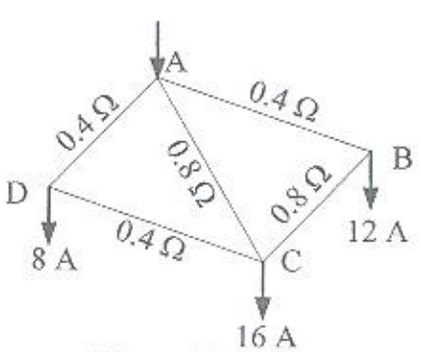


Figure (2)

(With My Best Wishes)

Dr. Ibrahim Bedir

جـــامعة طنـــطا　　الفصل الدراسي الأول ٢٠٠٨/٢٠٠٩

كـــلية الهندســـة　　الفرقة : الثانية كهرباء - قوى

المـــادة : الهندسة المدنية　　الزمن : ثلاث ساعات

أجب على جميع الأسئلة الآتية

السؤال الأول

أ- أذكر ما تعرفه عن الأشكال التقريبية لسطح الأرض الطبيعي.

ب- المطلوب تصميم ورسم مقياس تخطيطي لخريطة مقيـــاس رسمهـــا ١ : ٥٠٠٠ بحيـــث يمكـــن استخدامه للقراءة إلى اقرب ٢ متر. وضح بالرسم كيف يمكن توقيع خط طوله ١١٦ متر علـــي هذه الخريطة.

السؤال الثاني

أخذت القراءات الآتية في مشروع ميزانية فكانت كالآتي :

١,٥٦ — ٢,٣٦ — ٣,٨٧ — ٠,٨٤ — ٢,١٢ — ٣,١٥ — ٤,٦٢ — ٢,٨٧ — ٣,٢٧ - ١,٢٧ - ٣,٦٤ — ٠,١١ — ٣,١٤ فإذا كانت النقطة الثانية والخامسة والسابعة دوران وكانت القراءة فوق النقطة التاسعة مأخوذة والقامة مقلوبة - أوجد في جدول ميزانية مناسيب النقط المختلفة مع إجـــراء جميع التحقيقات الحسابية الممكنة إذا علمت أن منسوب النقطة الخامسة = ١٠,٥٨ متر.

السؤال الثالث

يراد مد كابل كهرباء ضغط عالي بين النقطتين أ ، ب فإذا قيست المسافة الأفقية بينهما من خريطـــة مقياس رسمها ١: ١٥٠٠ فكانت مساوية ٣١,٢ سم وكان عدد الأبراج المستخدمة لمد الكابل هـــو سبعة أبراج وجميعها بنفس الارتفاع وكان سطح الأرض يميل بزاوية ثابتة بين النقطتين = ٨° أوجـــد طول الكابل الحقيقي الذي يجب صرفه من المخازن إذا علمت أن سهم الترخيم في منتصف المـــسافة بين كل برجين = ٨% من المسافة الأفقية بينهما.

مع تمنياتي بالتوفيق

د. حـــافظ عبـــاس عفيـــفي

جامعـــة طنطـــا- كليـــة الهندســـة — الفرقة الثانية هندسة القوى الكهربية — ٢٠٠٨ - ٢٠٠٩

اختبار نهاية الفصل الدراسى الأول — مادة : "هندسة مدنية" — (الورقة الثانية)

السـؤال الأول:-

وضح بالرسومات المتقنة وكافة البيانات على الرسم كلا مما ياتي:

أ- دورة انتقال الأحمال من المنشأ الى التربة.

ب- الأنواع المختلفة للأساسات السطحية.

ت- شكل توزيع الاجهادات داخل التربة خلال مستوى رأسى يمر بمنتصف الأساس.

ث- بعض الأسباب التى تؤدى لحدوث ظاهرة الهبوط النسبى فى المنشآت.

ج- الأسباب التى تؤدى لاعتماد الأساسات العميقة كنظام للتأسيس بدلا من الأساسات السطحية.

السـؤال الثانى:-

أ- ماهى التربة، وكيف تكونت؟

ب- ماهى أهم الفروق بين التربة المتماسكة والتربة الغير متماسكة؟

ت- أذكر أمثلة على بعض أنواع التربة المتماسكة والغير متماسكة.

ث- كيف يمكن تصنيف التربة طبقا لقطر حبيباتها؟

ج- أذكر باختصار أهم أسباب تولد الاجهادات داخل التربة.

السـؤال الثالث:-

أ- أذكر ما تعرفه عن التربة ذات المشاكل.

ب- أذكر أنواع الهبوط الذى يحدث للتربة أسفل المنشآت.

ت- "الهبوط الكلى أكثر خطورة على المنشأ من الهبوط النسبى" تحقق من صحة هذه العبارة مع التعليل.

ث- المطلوب حساب قيمة الاجهادات الكلية المتولدة فى كابل كهربائى نتيجة لحمل مركز مقداره ٨,٠ طن يؤثر بمنتصف قاعدة أبعادها ١,٠ x ١,٠ متر تقع على سطح الأرض، اذا علمت أن السطح العلوى للكابل يقع على عمق ٤ أمتار أسفل الأساس وأن وزن وحدة الحجوم للتربة الموجود بها الكابل هو ١,٩ طن / م^3

ملحوظة: استخدم الطريقة التقريبية لحساب الاجهادات الناتجة عن الحمل المركز.

أطيب الأمنيات بالنجاح والتفوق

د. أحمد فاروق

جامعة طنطا
كلية الهندسة
قسم الفيزيقا والرياضيات الهندسية

المـــــــــادة : رياضيات هندسية (٣) أ
الزمـــــــن :٣ساعات
الفرقـــــــة : الثانية (إتصالات + قوى كهربية)
تاريخ الإمتحان : ٢٨/ ١/ ٢٠٠٩ (الفصل الأول)

Answer the questions **[85 Mark]**

Question 1 [40 Mark]

1-a) Fit the readings

x	1.00	1.25	1.5	1.75	2.00	2.25
y	1.12	0.92	0.75	0.61	0.51	0.42

for the exponential curve $y = b e^{ax}$

1-b) In an examination the number of students who obtained marks between certain limits were as follows :

Marks	0 - 19	20 - 39	40 - 59	60 - 79	80 - 99
No. of students	41	62	65	50	17

Estimate the number of students who obtained less than 70 marks.

1-c) Evaluate $\int_4^{52} \ln x \, dx$ correct to 6 decimal by using Simpson s Rule .

1-d) Obtain the estimate of the missing figures in the following table

x	2.0	2.1	2.2	2.3	2.4	2.5	2.6
f(x)	0.135	- -	0.111	0.100	- -	0.082	0.074

Question 2 [45 Mark]

2-a) Find the value of y at $x = 2.6$ by using modified Euler s Methods with $h = 0.2$, if $y = \sqrt{x^2 + 4y^2}$, $y(2.2) = 1.5$

2-b) Compute numerically the first two rows of the solution of the wave equation

$\frac{\partial^2 u}{\partial t^2} = 4\frac{\partial^2 u}{\partial x^2}$, $0 \le x \le 1$, $t \ge 0$, take $h = 0.2, k = 0.05$

with the boundary and initial conditions

$u(0,t) = u(1,t) = 0$

$u(x,0) = \sin \pi x$, $\frac{\partial u}{\partial t}(x,0) = 0$

2- c) Using Gauss - Seidel Method , solve the system of linear equations

$5x_1 - x_2 + 3x_3 = -2$, $x_1 + 5x_2 - 2x_3 = 10$, $2x_1 - 4x_2 + 10x_3 = 6$

2-d) Use the finite difference method with $n = 4$ to approximate the solution of the boundary - value problem

$y'' + 6.55(x + 1)y = 1$, $y(0) = 0, y(1) = 0$

جامعة طنطا
كلية الهندسة
امتحان الفصل الدراسي الأول
للعام ٢٠٠٨/٢٠٠٩

المقرر: الهندسة الميكانيكية
الفرقة: الثانية كهرباء (قوى)
الزمن: ٣ ساعات

أجب عن الأسئلة الآتية:- استخدم الرسم كلما أمكن ذلك

السؤال الأول

أ- اشرح مع الرسم التناظر الكهربي والهيدروليكي والحراري؟ ثم استنتج معادلة التوصيل الحراري خلال الاسطوانات متحدة المركز؟

ب- يعتبر المانومتر المائل Inclined tube manometer تطوير لـ U-tube manometer اشرح ذلك مع الرسم؟

جـ- اشرح مع الرسم كل من:-

1- أنبوب بيتو (Pitot tube)   2- الميل الهيدروليكي والميل البيزومتري

د- أنبوب بخار قطره الخارجي 0.12 m معزول بطبقة من سيليكات الكالسيوم وتخانتها 20 mm و $k = 0.089\ W/m.K$ فإذا كانت درجات حرارة السطحين الداخلي والخارجي للطبقة العازلة هما $T_{s_1} = 800\ K$ ، $T_{s_2} = 490\ K$ على التوالي.
أحسب الفقد الحراري لوحدة الطول من الأنبوب.

السؤال الثاني

أ- اذكر توصيف وتصنيف محركات الاحتراق الداخلي؟ ثم اشرح مع الرسم منظومة تغذية الوقود لكل من محركات البنزين ومحركات الديزل؟

ب- اشرح مع الرسم قطاع في اسطوانة محرك احتراق داخلي رباعي الأشواط؟ موضحاً كيف يعمل؟

جـ- يعتبر التبريد بالهواء أفضل من التبريد بالماء للمحركات من ناحية الصيانة. اشرح ذلك؟

د- محرك سيارة اشتعال بالشرارة رباعي الأشواط يولد قدرة فعالة 94 KW عند سرعة 2000 r.p.m وإذا كان المحرك ذو 6 اسطوانات قطر اسطوانة الواحدة 80 mm وطول الشوط 108 mm أحسب:-

1- حجم الشوط
2- سعة المحرك
3- الضغط المتوسط الفعال
4- العزم

السؤال الثالث

أ- اشرح كيف تؤثر كثافة الشحنة على القدرة المقصودة لمحركات الاحتراق الداخلي ؟

ب- اذكر ما تعرفه عن صعوبات واختبار دورة الوقود من محركات الديزل ؟

ج- اشرح مع الرسم تجربة عملية لإختبار آداء محركات الاحتراق الداخلي ؟

د- منظومة مغلقة كتلتها 40 kg وسرعتها الابتدائية 12 m/sec . إزدادت سرعتها إلى 31 m/sec وازداد إرتفاعها كذلك الى 43 m . إستلمت المنظومة خلال هذا الاجراء 25000 J من الحرارة و 4800 J من الشغل. واعطيت المنظومة 0.0028 KWh (كيلوات ساعة) على شكل طاقة كهربائية . أحسب التغير في الطاقة الداخلية للمنظومة .

السؤال الرابع

أ- اذكر ما تعرفه عن:-

1. انبوبة بوردون   2- الضغط المقوط البياني   3- التدفق المستقر والغير مستقر

ب- عرف خاصية التكهف للمضخات ؟ ثم اشرح مع الرسم الاستخدامات الاساسية للمضخات ؟

ج- استنتج معادلة برنولي لانبوب سريان مستقر من سائل حقيقي ؟ ثم اشرح مع الرسم التمثيل الهندسي لمعادلة برنولي ؟

د- استنتج الصيغة الرياضية للقانون الأول للديناميكا الحرارية ؟ ثم اشرح الفرق بين النظام المغلق والنظام المفتوح موضحاً ذلك بأمثلة تطبيقية ؟

هـ- موقد ترك أجوف على شكل متوازي مستطيلات ذو أبعاد داخلية

76 cm x 61 cm x 46 cm

وابعاده الخارجية هي 81 cm x 66 cm x 51 cm

اوجد القدرة الداخلية للموقد بالواط اللازمة لإحداث حالة الاستقرار. تجاهل الحرارة المفقودة للأركان وحواف الموقد مع العلم أن درجة حرارة الجدران الداخلية والخارجية للجدار هي 204 °C و 38 °C على التوالي وأن مصنوعة من مادة الاسبستوس . الموصلية الحرارية له 0.166 W/(m.K)

Tanta University
Faculty of Engineering
Electrical Power and Machines Engineering

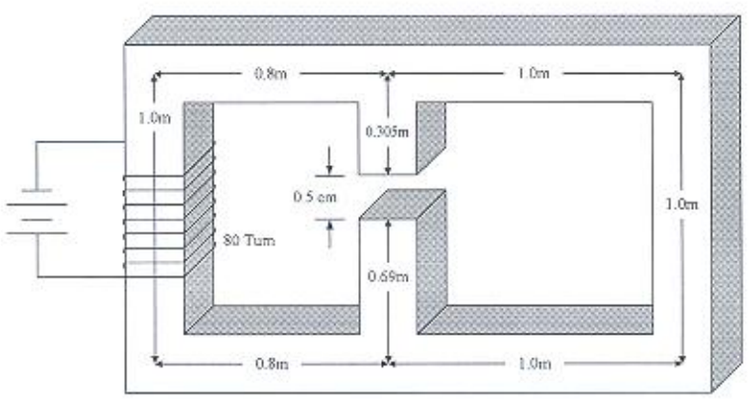
Electromagnetic Energy Conversion
Second Year/ First Term/ Final Exam
Time: 3:00 hr Max Marks: 90

Attempt All Questions

Question 1: Marks: **[18]**

a- Distinguish briefly between the following pairs of quantities: [8]
1- Renewable and non-renewable energy resources
2- Energy and co-energy
3- Self and mutual inductances
4- Electromotive force and magnetomotive force

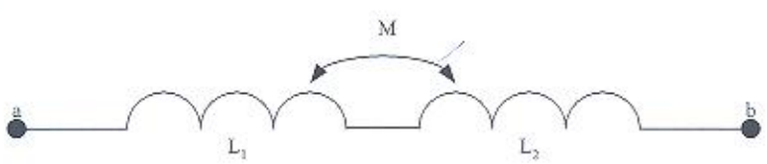
b- Determine the voltage that must be applied to the coil shown in figure to produce a flux density of 0.2T in the airgap. The coil resistance is 2.05Ω. The core cross section is $0.04m^2$. Neglect fringing and losses. [10]



Magnetic circuit of Q1-b

Question 2: Marks: **[18]**

a- Show that the two coupled coils shown in figure can be replaced by a single coil having an inductance of $L_{ab}=L_1+L_2\pm 2M$. Show the possible dot marks positions where the third term has negative sign. [8]



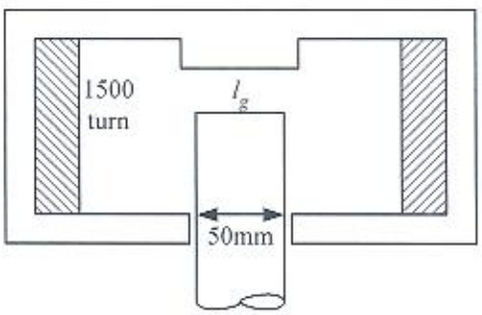
Circuit of Q2-a

b- When two coils are connected in series, their effective inductance is found to be 10.0H. However, when the connections to one coil are reversed, the effective inductance is 6.0H. If the coefficient of coupling is 0.6, calculate the self inductance of each coil and the mutual inductance. [10]

Question 3: Marks: **[18]**

a- In the scope of your experimental study, show how you can obtain the hysteresis loop for a certain magnetic material. Draw the equivalent circuits and state the necessary equations. What are the factors affecting the area of hysteresis loop and hysteresis losses. [8]

b- A plunger relay is shown in the diagram. When it is energized the current remain constant at 2.0A and the plunger moves such that the airgap is reduced in length from 20mm to 10mm. If losses may be neglected, calculate the average force experienced by the plunger and the energy taken from source. The airgap at the hole through which the plunger armature moves may be neglected. [10]



Question 4: Marks: **[18]**

a- Drive an expression for the magnetomotive force produced by symmetrically distributed windings with 120 shift in space when excitation with balanced three phase currents. [8]

b- Find the values of main dimensions of a 1000KVA, 50Hz, 370rpm, three phase generator. The specific magnetic loading is 0.55Wb/m^2 and the specific electric loading is 28000 AC/m. Assume winding factor 0.955. The [redacted] axial length is twice the pole pitch (L/τ). [10]

Question 5: Marks: **[18]**

a- Derive an expression for the voltage induced on a coil of T turns under sinusoidal variation of flux. The flux maximum value is ϕ with frequency f. [6]

b- Calculate the pitching and distribution factors for a three phase machine with 96 stator slot, 6 poles and coil span 1 to 12. [6]

c- Calculate the loss of energy cased by hysteresis in one hour in 50Kg of iron if peak density reached is 1.3Wb/m^2 an the frequency is 25Hz. Assume Steinmetz index is 1.6 and hysteresis loss coefficient as 628J/m^3. Density of iron 7.8×10^3 Kg/m^3. [6]

With Best Wishes

جامعة طنطا
كلية الهندسة
قسم الفيزيقا والرياضيات الهندسية

المادة : رياضيات هندسية (أ)
الفرقة : ثانية قوى كهربية (لائحة قديمة)
تاريخ الإمتحان : ١٧/ ١/ ٢٠٠٩

Answer the following Questions

1-a) If a car is traveling along a straight road with constant speed $v = b_1$ [m/sec.] , its position y [m] at time t [sec.] is $y = b_0 + b_1 t$. Suppose that measurements are

t	0	3	5	8	10
y	200	230	240	270	290

Fit a straight line to these data by least squares and estimate from it the speed .

1-b) Given the data

x	0.1	0.2	0.3	0.4	0.5
y = f (x)	0.70010	0.4016	0.1081	- 0.1744	- 0 . 4375

Find an approximate value of the zero of f (x) between 0.3 and 0.4

1-c) Obtain the estimate of the missing figures in the following table

x	2 .0	2 .1	2.2	2.3	2.4	2.5	2.6
f(x)	0.135	- -	0.111	0.100	- -	0.082	0.074

2-a) Evaluate $I = \int_0^1 e^{-x^2} dx$ by Simpson s Rule with $n = 10$

2-b) Find the value of y at $x = 2.6$ by using modified Euler s Methods with $h = 0.2$, if $y = \sqrt{x^2 + 4y^2}$, $y(2.2) = 1.5$

2-c) Apply Runge – Kutta Method to find an approximate value of y when $x = 0.2$ given that

$\frac{dy}{dx} = x + y$, $y = 1$ when $x = 0$ (take $h = 0.1$)

Tanta University (لائحة قديمة) 2nd year 1st term Exam.
Faculty of Engineering Logic and Electronic Circuits
Dept. of Electrical Power Eng. Time allowed : 3 Hours

Answer the following questions:

1- a- Find the Z- parameters of the T-network that has $Z_a = 8\ \Omega$, $Z_b = 10\ \Omega$, and $Z_c = 12\ \Omega$.
b- Find the ABCD parameters of the ideal transformer that has turns ratio of 10 : 4.
c- Find the input impedance of the ideal transformer that is given in (1-a) when it is loaded by a capacitor of 10 micro Farad.

2- a- Find the Y-parameters of the π-network that has $Y_1 = 0.4$ mho, $Y_2 = j\ 0.4$ mho, and $Y_3 = -j\ 0.3$ mho.

b- A Common Emitter Amplifier has the parameters, $h_{re} = 0$, $h_{ie} = 200\ \Omega$, $h_{fe} = 100$, and $h_{oe} = 100\ \mu$ mho. Also $R_E = R_L = R_C = 800\ \Omega$, $R_1 = 1.3\ k\Omega$, $R_2 = 2.7\ k\Omega$, $R_S = 2\ k\Omega$, and $C_E = C_i = C_o = 20\ \mu$ Farad. Calculate the input impedance, voltage gain, and the current gain.

3-a- Show how you could use the operational amplifier to integrate the following inputs:

$V_a = 5$ Sin ωt, $V_b = 5\ t$, $V_c = 5$

b- A five bits A/D converter with resolution 0.5, and $R_F = 0.35$ LSB resistance. Determine the output voltage when the input voltage is "11010".

---

4 - Draw the logic circuit of the following functions, and minimize them,

$$F_1 = C + AB\overline{C} + AB$$

$$F_2 = ABC\overline{D} + A\overline{B}C\overline{D} + AB\overline{C}\ \overline{D} + A\overline{B}\ \overline{C}\ \overline{D}$$

5- a- Simplify the functions:

$$F_1 = \sum 0, 1, 2, 3, 4, 6, 7, 8, 12, 13$$

$$F_2 = \overline{A}BC + \overline{A}B\overline{C} + A\overline{B}\ \overline{C} + A\overline{B}C$$

$$F_3 = \overline{A}C + \overline{A}B + A\overline{B}C + BC$$

b- Compare between calculating the value of the following function as Sum of Products and as Product of Sum;

$$F = \overline{A}\ \overline{B} + \overline{A}B + A\overline{B} + AB$$

جامعة طنطا – كلية الهندسة
قسم هندسة الحاسبات والتحكم الآلي
امتحان الفصل الدراسي الأول للعام الجامعي ٢٠٠٨/٢٠٠٩

الفرقة الثانية حاسبات- قوى كهربية (قديم)
المادة : تحليل الدوائر الكهربية (من الخارج)
الزمن : ثلاث ساعات يناير ٢٠٠٩

Answer the following five questions:

Q(1): For the circuit in Fig. Q1

a) Prove that $V_o = \frac{R_b}{R_a}(V_b - V_a)$ when $\frac{Ra}{R_b} = \frac{R_c}{R_d}$

b) For $\frac{Ra}{R_b} = \frac{R_c}{R_d} = \frac{2}{5}$, $V_b = 4.0$ V and $V_{cc} = 15$ V, what range of values for V_a will result in linear operation?

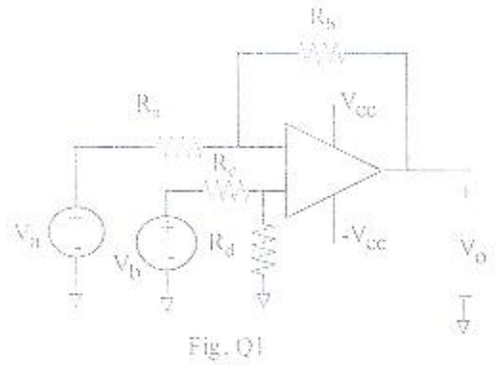


Fig. Q1

Q(2): The voltage pulse described by the following equations is impressed across the terminals of 0.5 μF capacitor:

$V(t) = 0 \qquad t \le 0$

$V(t) = 5t \qquad 0 \le t \le 4$

$V(t) = 20\, e^{-(t-4)} \qquad 2 \le t \le \infty$

a) Derive the expressions for the capacitor current, power, and energy.

b) Specify the interval of time when energy is being delivered by the capacitor.

Q(3): a) Deduce the current response for an RL circuit with step voltage source.

b) The current source in the circuit generates the current pulse shown in Fig. Q3. There is no energy stored at $t = 0$.

1- Derive the numerical expressions for v(t) for the time intervals $t < 0$, $0 < t < 50$ μs, and $50\ \mu s < t < \infty$

2- Calculate $v(50^+\ \mu s)$ and $v(50^-\ \mu s)$

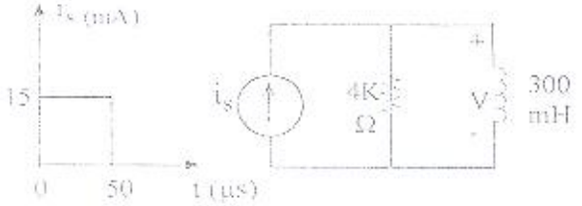


Fig. Q3

(انظر الصفحة التالية)

Q(4): The switch in the circuit shown in Fig. Q4 has been in position a for a long time. At t = 0 the switch is thrown to position b. Find

a) $V_c(t)$ for $t \geq 0$

b) i(t) for $t \geq 0^+$

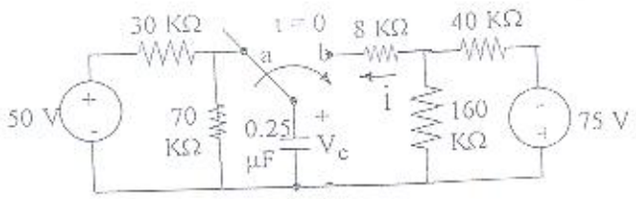


Fig. Q4

Q(5): The initial energy stored in the circuit in Fig. Q5 is zero. At t = 0, a dc current source of 20 mA is applied to the circuit.

a) What is the initial value of I_L and dI_L/dt ?

b) What is the numerical expression for $I_L(t)$ when $t \geq 0$?

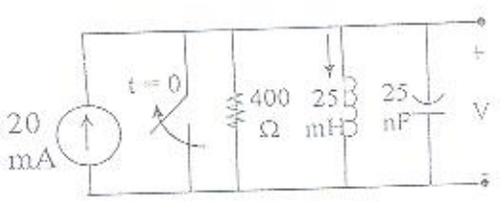


Fig. Q5

مع أطيب الأمنيات بالتوفيق والنجاح

نسخه
مرى قديم ٢٠٠٦/٧

Tanta university	**Final Term Exam**
Faculty of engineering	**2-nd Year**
Electrical Power and Machine Dept.	**2008-2009**
A course of Power System (1)	**Allowable Time: 3 H**

Solve The Following Questions

Question 1 (25 Marks)

a) Define The following terms and state the factors that affect each one:

(i) Skin Effect

(ii) Ferranti Effect.

b) A balanced 3-phase overhead transmission line has a total series impedance per phase of $200\angle 80^0\,\Omega$/phase and a total shunt admittance of $0.0013\angle 90^0\,\Omega^{-1}$/phase. The line delivers a load of 80 MW at 0.8 lagging power factor and 220 kV. Calculate: (i) the ABCD for T-model representation; (ii) the sending end voltage, current and power factor of the line; (iii) the line efficiency and line voltage regulation.

Question 2 (20 Marks)

a) Derive an expression of line inductance for three phase transmission line with an unequal spacing.

b) Three-phase double circuit are arranged as shown in Figure (1). If the diameter of each conductor is 5 cm, find capacitive reactance to neutral and the charging current per km per phase at 220 kV and 50 Hz, assuming that the line is regularly transposed.

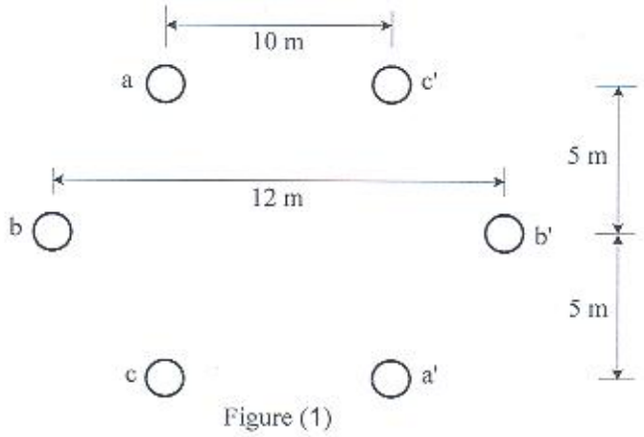


Figure (1)

Question 3 (25 Marks)

a) (i) **What are** the main types of distribution systems according to scheme of connections?

(ii) **What are** the main methods used to improve string insulators efficiency?

b) Define the following terms: (i) Flashover voltage; (ii) Puncture voltage

c) A DC ring distributor shown in Figure (2) is fed at point A from 250 V supply. The resistances of the various sections (go and return) are indicated in Figure (2). **Determine**: (i) the current in each distributor sections; (ii) the load voltages; (iii) the distributor efficiency.

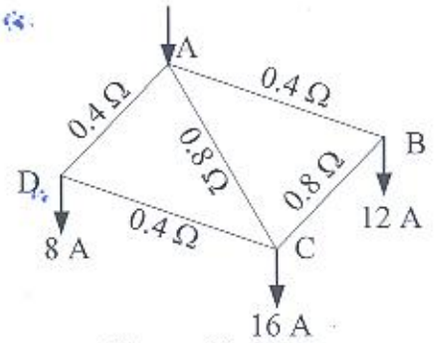


Figure (2)

Question 4 (20 Marks)

a) Compare between aluminum and copper conductors.

b) An overhead line is supported between two towers 200 m apart having a difference in their levels equal to 10 m. The conductor diameter is 2 cm and weight of 2.3 kg/cm. **Calculate** the position of minimum point of conductor from each tower if the wind pressure is 57.5 kg/cm^2 of projected area and a factor of safety is 4. The maximum tensile strength of copper is 4220 kg/cm^2

(With My Best Wishes)

Dr. Ibrahim Bedir

جامعة طنطا
كلية الهندسة
قسم القوى الكهربية

المادة/ اقتصاد هندسى
(EP21H2)
الفرقة الثانية (لائحة قديمة)

بسم الله الرحمن الرحيم
التاريخ : 2009 /1/28
الزمن : ساعتان

أجب عن الأسئلة الآتية:- (30 درجة)

السؤال الأول:-

1- " هناك العديد من انواع التكاليف تستخدم فى الاقتصاد الهندسى عند تحليل الجدوى المالية للمشروعات الصناعية" تكلم بالتفصيل عن انواع التكاليف.

2- تكلم عن اهم الخطوات الرئيسية للدراسة الاقتصادية .
3- اشرح بالتفصيل العناصر الاساسية لتصنيع منتج ما.

السؤال الثانى:-

1- ما هى العناصر الاساسية لتكلفة منتج ما.
2 -ما اهمية دراسة الجدوى الفنية للمشروعات- مع شرح لأهم المسائل التى تعالجها دراسات الجدوى الفنية.
3- اشرح بالتفصيل أهم مراحل المفاضلة بين المشروعات.

مع أطيب التمنيات بالنجاح
ا.د/عبد الفتاح مصطفى خورشد

قوى - كهربية - قديم
تحويل الطاقة

Tanta University
Faculty of Engineering
Electrical Power and Machines Engineering

Electromagnetic Energy Conversion
Second Year/ First Term/ Final Exam
Time(٣:٠٠ hr)

Attempt All Questions

Question ١:

١- A series magnetic circuit consists of a permanent magnet, a steel material with assumed infinite permeability and an air gap. Derive the necessary condition to minimize the volume of the permanent magnet for a desired value of the flux density in the airgap.

٢- Show that the two coupled coils shown in Fig.١ can be replaced by a single coil having an inductance of $L_{ab}=L_1+L_2\pm 2M$. Show the possible dot marks positions where the third term has negative sign.

Question ٢:

١- For a singly-excited translational magnetically linear electro-mechanical energy system, derive an expression for current, flux linkage and force in terms of stored energy and coenergy.

٢- Fig. ٢ shows a solenoid where the core cross section is square.

i. For a coil current of I (DC), drive an expression for the force on the plunger.

ii. Let the coil have a resistance R and be excite by a voltage of $v(t)=V_m \sin(\omega t)$. For a displacement g between the plunger and the pole. Determine the steady state coil current and mechanical force.

Question ٣:

١- For two magnetically coupled coils, show that the total stored energy W_t is given by:

$$W_t = \frac{1}{2}L_{11}I_1^2 + \frac{1}{2}L_{22}I_2^2 + MI_1I_2$$

٢- a) For a doubly excited rotating magnetically linear electromechanical energy system with cylindrical start and salient rotor, sketch the space variation of self and mutual inductances.

b) In a doubly excited rotating system both the rotor and stator self inductances are assumed constants. The mutual inductance is a cosinusoidal function of the angular position. The two windings are connected in series and carry a current $i_1 = 5\sqrt{2}\sin(\omega t)$. Drive expressions for the average and peak values of the torque acting on the rotor that rotates with an angular speed ω rad/sec.

Question ٤:

١- Write notes on the following:

a- conversion of solar energy into electrical energy

b- utilization of geothermal energy for electricity generation

٢- For an AC excited single phase distributed windings of ٦ slots:

i- Deduce graphically the space distribution of the resultant mmf.

ii- Explain the nature of the MMF produced, then

iii- Show that this MMF can be viewed as the resultant of two rotating MMFs in opposite directions.

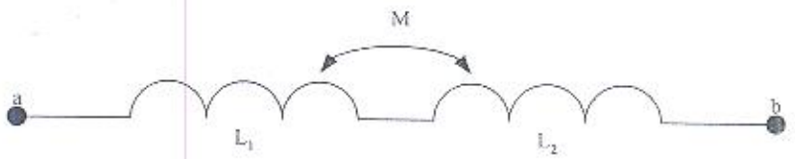


Fig. ١

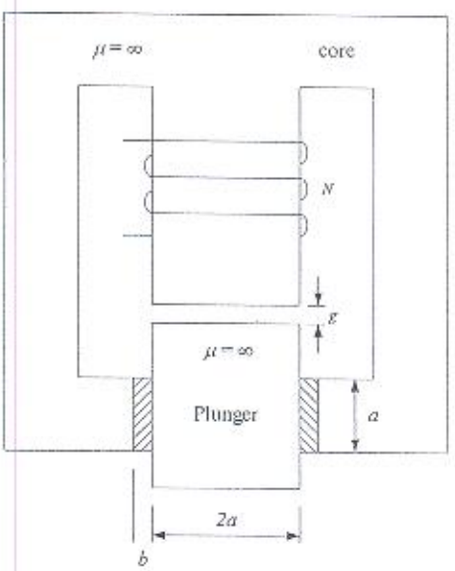


Fig. ٢

With Best Wishes

TANTA UNIVERSITY

Electrical Power and Machines Department

Faculty of Engineering

Final EXAM 2009/2010 - First Term

Course	Energy Conversion (EPM2106)	Time Allowed	3 hours
Students	2nd Year (Electrical Power and Machines)	Total Mark	90
Date	Sat. 23rd January, 2010	Number of pages	4

Attempt ALL the following questions and problems:

- *Clarify your answer with the suitable sketches as you can.*
- *Assume any missed data reasonably.*

The first question (15 marks)

Choose the correct answer/answers for the following statements. It is sufficient to write down the question number followed by your choice/choices in your answer sheet:

1. Higher magnetic permeability leads to
   A) higher inductance
   B) lower inductance
   C) more flux leakage
   D) lower iron losses

2. Iron losses depend on
   A) electric supply frequency only
   B) flux level only
   C) area of hysteresis loop of the material only
   D) all the of the above choices

3. Compared with magnetic materials, permanent magnetic material has higher values of
   A) magnetic field intensity (H)
   B) flux density (B)
   C) relative permeability (μ_r)
   D) current

4. Mutual inductance between two coils increases with increase of:
   A) angle between their axes
   B) distance between them
   C) their currents
   D) none of the above choices

5. For mutually coupled coils, if currents are both entering at the dot-marked terminals, coil fluxes
   A) are additive
   B) are subtractive
   C) increase
   D) cancel each other

6. For ideally coupled coils, coupling coefficient is
   A) zero. B) unity C) infinity D) between zero and unity

7. The stored energy in magnetically coupled coils *does not* depend on
   A) coupling coefficient between coils.
   B) angle between coils
   C) direction of motion
   D) direction of currents

8. For dc excitation, induced emf is
   A) always zero
   B) only transformer voltage
   C) both speed and transformer voltages
   D) only speed voltage

9. A rotating system with salient stator and rotor, electromechanical energy conversion is possible if:
   A) only stator winding is excited.
   B) only rotor winding is excited.
   C) both stator and rotor windings are excited.
   D) either stator or rotor winding is excited.

10. For a rotating system with salient stator and cylindrical rotor:
   A) only stator self inductance is function of rotor position
   B) rotor self inductance is NOT a function of rotor position
   C) both rotor self inductance and mutual inductance are functions of rotor position
   D) all inductances (self and mutual) are functions of rotor position

11. A rotating system with ac excitation for stator and dc excitation for the rotor is called a
   A) reluctance machine B) synchronous machine
   C) induction machine D) dc machine

12. A two-phase winding excited from a two-phase gives
   A) a single rotating mmf
   B) two rotating mmfs with anti-direction
   C) stationary mmf
   D) pulsating mmf.

13. Renewable sources of energy has the advantage of
   A) low running cost
   B) low initial (capital) cost.
   C) cheap equipments
   D) continuous availability

14. To obtain higher voltages, solar cells are connected
   A) in parallel
   B) in series
   C) in series-parallel combination
   D) with a battery of higher voltage

15. The most effective quantity on the available mechanical energy at shaft of a wind turbine is:
   A) air density B) turbine diameter C) wind speed D) turbine power coefficient

The second question (10 marks)	
Which of the following statements is correct? You can write down in your answer sheet the question number followed by either ✓ or X mark.	
1.	Inductance of a coil increases with increase in magnetic reluctance of its core.
2.	For a linear magnetic system, coil inductance does not depend on its current
3.	Motional (speed) voltage increases with increasing supply frequency
4.	Mutual inductance between two coils depends on their self inductances
5.	For linear magnetic system stored energy equals co-energy.
6.	Direction of electromagnetic torque is to increase inductance
7.	Transformer voltage depends on coil inductance variation with position.
8.	The mutual inductance between two magnetically coupled coils *must be* lower than the smaller self inductance of each coils
9.	For doubly excited rotating system, it is necessary to have some saliency for possible electromechanical energy conversion.
10.	Distributed winding provides more sinusoidal mmf space variation

The third question (22 marks)	
1.	Discuss what is meant by magnetic flux leakage and fringing in the magnetic circuits; then show how to minimize them. (4 marks)
2.	With the aid of BH curve of a permanent magnet material show: (4 marks) a) the effect of air gap length on the position of the operation point b) the point of maximum energy product
3.	Explain the dot convention employed to determine the polarity of the mutually induced voltages. Then show how it can be determined experimentally. (4 marks)
4.	For a singly-excited rotating electromechanical energy converter, derive a relation for the developed torque in terms of both stored energy and co-energy. (5 mark)
5.	With the aids of current-flux linkage curves, derive how to determine energy converted into mechanical motion from a certain position to another. (5 marks)

The fourth question (28 marks)	
1.	For a doubly-excited electromechanical energy conversion device of cylindrical stator and rotor: a) Sketch the space variation of self and mutual inductances. (2 marks) b) Derive a general expression for the electromagnetic torque acting on the rotor. (6 marks) c) Show all the possible electrical machines can be obtained. (2 marks)
2.	Show the MMF space distribution a dc-excited coil of uniform air gap, if the conductors are : a) concentrated b) distributed in 8 slots (4 in each side). Which of the two cases are preferred? Why ? (4 marks)

3. Both analytically and graphically, show that balanced three-phase windings excited by balanced three-phase currents, produce a single rotating MMF wave. (4 marks)

4. Give brief notes on advantages and disadvantages of renewable sources of energy. (4 marks)

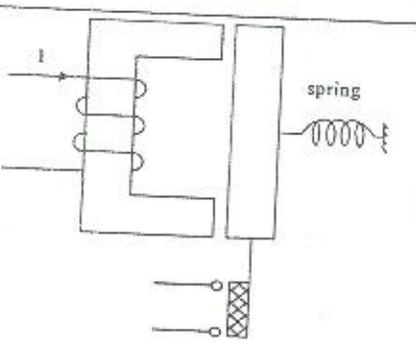
5. Using suitable clarifications of sufficient data, show the following: (6 marks)
   a) Solar cell characteristics
   b) Wind turbine characteristics
   c) Components of a photovoltaic generating system.
   d) A wind-energy-based generating system.

The fifth question (15 marks)

1. The relay shown in figure has mean core length of 40 cm. The air-gap lengths are 2 mm each. The coil has 1000 turns. The core is made of a steel having B-H relation given in the following table:

H (AT/m)	400	500	700	900	1100	1400
B (T)	0.4	0.6	0.8	1.0	1.1	1.2

A flux density of 0.9 Tesla is required to actuate the relay. Find the necessary coil current. (5 marks)



2. The self and mutual inductances of two exciting coils of a multiply-excited translational system are:

$$L_{11} = L_{22} = \frac{3.6}{1+2x} \quad \text{and} \quad L_{12} = L_{21} = \frac{1.8}{1+2x}$$

The two coils are connected in series to a voltage supply of 100 cos(314t). If the displacement x is held at 40 cm, find
   a) current (as a time expression) (5 marks)
   b) average force (5 marks)

Good Luck and best wishes
Prof. Essam Eddin M. Rashad

Tanta University

Department: Elec. Power and Machines Engineering
Total Marks: 70 Marks (for the 2 pages)

Faculty of Engineering

Course Title: Civil Engineering	Course Code: CSE 2155	Year: 2nd
Date: February 1, 2010 (First term)	Allowed time: 3 hrs	No. of Pages: (2)

Remarks: (answer all the following questions, and assume any missing data)
(answers should be supported by sketches)

السؤال الأول (١٥ درجة)

أ- أذكر أنواع مقاييس الرسم المختلفة ثم وضح مزايا مقاييس الرسم التخطيطية عن غيرها. **(٥ درجات)**

ب- المطلوب تصميم ورسم مقياس رسم تخطيطي ١ : ١٠٠٠ يقرأ مباشرة إلى اقرب ١,٥ ذراع معماري ثم بين عليه خطا طوله ١٤٥,٥ ذراع معماري - وضح بالرسم مستخدماً الفرجار كيف يمكن تعيين طول الخط أب في الطبيعة إذا كان طوله في الخريطة مساويا ٦,٩ سم. **(١٠ درجات)**

السؤال الثاني (١٥ درجة)

أ- وضح بالرسم فقط اشكال روبيرات الدرجة الأولى والثانية المثبتة في الحائط. **(٥ درجات)**

ب- أخذت القراءات الآتية في مشروع ميزانية فكانت كالآتي :

١,١٩ — ٢,٣٦ — ٣,٧٨ — ٠,٨٤ — ١,٣٣ — ٣,١٥ — ٤,٠٦ — ٢,٨٧ — ٣,٤٥ — ١,٣٦- ٢,٦٥ —
٠,١١ — ٣,٦٧ - ٢,٨٦

فإذا كانت القراءات الثالثة والسادسة والثامنة مقدمات وكانت القراءة فوق النقطة التاسعة مأخوذة والقامة مقلوبة - أوجد في جدول ميزانية مناسيب النقط المختلفة مع إجراء جميع التحقيقات الحسابية الممكنة إذا علمت أن منسوب النقطة الرابعة = ٤,٦٨ م. **(١٠ درجات)**

السؤال الثالث (١٥ درجة)

يراد توقيع النقطة ب التي تبعد عن نقطة أ المعلومة مسافة أفقية مقدارها ٤٦٥,٢٦ متر فإذا كان سطح الأرض الطبيعي يأخذ انحداراً منتظماً في اتجاه أ ب بزاوية قدرها ١٠ درجات إلى أعلى وكان الطول الاسمي للشريط المستخدم لتوقيع نقطة ب يساوي ٥٠ متر و الطول الحقيقي له يساوي ٤٨,٧٢ متر وكانت درجة الحرارة أثناء القياس تساوي ٥٥ درجة فهرنهيت. أوجد طول المسافة المائلة التي يجب قياسها على سطح الأرض الطبيعي لتوقيع مكان النقطة ب في مكانها الصحيح.

مع تمنياتي بالتوفيق

د. حافظ عباس عفيفي

Tanta University

Department: Elec. Power and Machines Engineering
Total Marks: 70 Marks

Faculty of Engineering

Course Title: Civil Engineering Date: January 2010 (First term)	Course Code: CSE2155 Allowed time: 3 hrs	Year: 2nd Electrical Eng. No. of Pages: (1)

- Assume any missing data
- Answers should be supported by sketches

الورقة الثانية (25 درجة)

السـؤال الأول:- (7 درجات)

أ- عرف التربة موضحا كيف تكونت؟ (1 درجة)

ب- ماهى أهم الفروق بين التربة المتماسكة والتربة الغير متماسكة؟ أذكر أمثلة على بعض أنواع تلك التربة. (1 درجة)

ت- أذكر أمثلة على بعض أنواع التربة ذات المشاكل موضحا الاضرار التى تنشأ عند التأسيس عليها. (1 درجة)

ث- وضح كيف يمكن تصنيف التربة مستعينا بمنحنى التدرج الحبيبى وقطر حبيباتها ؟ (1 درجة)

ج- أذكر باختصار أهم أسباب تولد الاجهادات داخل التربة. (1 درجة)

ح- ما هى أهم الشروط التى يجب أن تتحقق فى الأساسات لضمان سلامة المنشآت. (1 درجة)

خ- أذكر أهم الطرق المتبعة فى تنفيذ الخوازيق. (1 درجة)

السـؤال الثانى:- (8 درجات)

وضح بالرسومات المتقنة وكافة البيانات على الرسم كلا مما يأتي:

أ- دورة انتقال الأحمال من المنشأ الى التربة. (2 درجة)

ب- الأنواع المختلفة للأساسات السطحية. (2 درجة)

ت- شكل توزيع الاجهادات أسفل الأساسات المرنة وكذلك الجاسئة. (2 درجة)

ث- بعض الأسباب التى تؤدى لحدوث ظاهرة الهبوط النسبى فى المنشآت. (2 درجة)

السـؤال الثالث:- (10 درجات)

أ- أذكر أنواع الهبوط الذى يحدث للتربة أسفل المنشآت. (1 درجة)

ب- "الهبوط الكلى أكثر خطورة على المنشأ من الهبوط النسبى" تحقق من صحة هذه العبارة مع التعليل. (1 درجة)

ت- ما هى قيم الهبوط الكلى والهبوط النسبى المسموح بها للأساسات طبقا للكود المصرى لتصميم الاساسات. (1 درجة)

ث- اذا علمت أن السطح العلوى لكابل كهربائى، يقع على عمق 3 أمتار أسفل سطح الأرض، فالمطلوب حساب قيمة الاجهادات الكلية المتولدة على سطح الكابل نتيجة لحمل مركز مقداره 40.0 طن يؤثر بمنتصف قاعدة برج كهربائى أبعادها 2.5 x 2.5 متر مزمع انشاؤها على سطح الأرض أعلى الكابل وذلك اذا علمت أن وزن وحدة الحجوم للتربة هو 1.75 طن / م3 . وما هى المسافة الافقية التى يجب أن يبعد بها الكابل عن منتصف المكان المحدد للقاعدة حتى يتلاشى تأثير الحمل المنتقل اليه من البرج. (7 درجة)

ملحوظة: استخدم الطريقة التقريبية لحساب الاجهادات الناتجة عن الحمل المركز.

أطيب الأمنيات بالنجاح والتفوق

د. أحمد فاروق

قوى ١/٣٠

Tanta University

Department: Elec. Power and Machines Engineering
Total Marks: 90 Marks

Faculty of Engineering

Course Title: Electrical Power Engineering (1)	Course Code: EPM2105	Year: 2nd
Date: January 30th 2010 (First term)	Allowed time: 3 hrs	No. of Pages: (2)

Remarks: (answer the following questions… assume any missing data… answers should be supported by sketches…etc)

Problem number (1) **(15 Marks)**

a) **Define** The following terms.
- i. Skin Effect
- ii. Transposition
- iii. ACSR
- iv. Flashover voltage
- v. Puncture voltage

b) The per unit length parameters of a 215 kV, 400 km, 50 Hz, three-phase transmission line are $y = j3.2\times10^{-6}\,S/km$ and $z = (0.1+0.5)\Omega/km$. The line supplies a 150 MW load at unity power factor. **Determine**: (a) the line voltage regulation; (b) the line efficiency.

Problem number (2) **(20 Marks)**

a) **Derive an expression** of line capacitance for three phase transmission line with an unequal spacing taking earth effect in your considerations.

b) The three-phase conductors of a three-phase line are arranged at the corners of a triangle of sides 2m, 2.5m and 4.5m. If the conductor diameter is 2 cm, **calculate** the line inductance and capacitance per phase per km. assuming that the conductors are being transposed and neglecting earth effect.

Problem number (3) **(15 Marks)**

a) **Compare** between aluminum and copper conductors.

b) For the equivalent capacitance arrangement shown in Fig. (1), find the voltage distribution over a string of three-phase suspension insulators and the string efficiency if the line voltage is 33 kV.

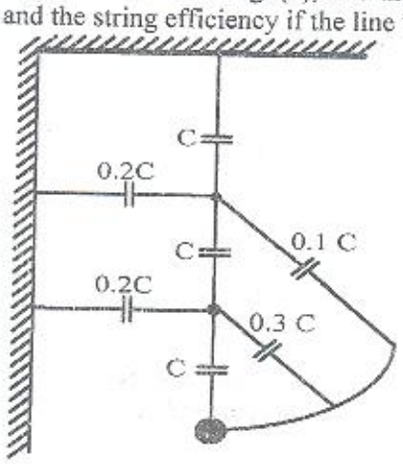


Fig. (1)

P. T. O.

Problem number (4) **(15 Marks)**

Put ☑ or ☒ against the number of the following sentences then correct the false sentences.

1. The skin effect of the conductor increases the effective value of conductor resistance.
2. If the length of overhead transmission line is increased its inductance increases.
3. If the power factor of load decreases, the line losses increase.
4. The sag of overhead transmission line depends on the tension on the conductor, ambient weather conditions and conductor material.
5. The ring main distribution system is not the more reliable distribution system.
6. If the length of transmitting tower is decreased, the line inductance increases.
7. By using guard ring, string efficiency is decreased.
8. The most important cause of power loss in the transmission line is the line inductance.
9. A line which connects a consumers to the distributor is called feeder.
10. Suspension type insulators are used for voltage beyond 11 kV.

Problem number (4) **(25 Marks)**

a) The towers of 40m and 100m respectively support a transmission line conductor at water crossing. The horizontal distances between the towers is 500m. If the ultimate strength is 3200 kg and the safety factor is 2.0, find the minimum clearance of the conductor and water and clearance mid-way between supports. Assuming weight of conductor is 1.5 kg/m and basses of supports at water level.

b) A DC two-wire ring distributor shown in Fig. (2) is fed from 250 V at A. the resistance of section AB, BC, CD, DE and EA is 0.075 Ω. Find: (a) the voltage at each load point; (b) the string efficiency; (c) repeat parts (a) and (b) if point A and D is interconnected by an inter-connector with 0.1 Ω resistor.

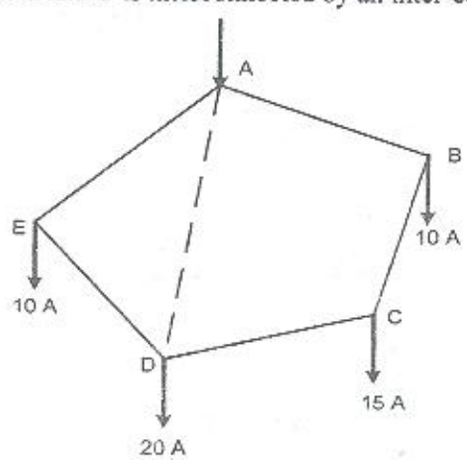


Fig. (2)

(With My Best Wishes)
Dr. Ibrahim Bedir

Tanta University

Department of Physics&Mathematics

Faculty of Engineering

Course Title: Numerical analysis
Date: (First term)2009

Year: 2nd Elec. Power
Allowed time: 3 hrs

No. of Pages: (2)

Problem number (1)

From the following table

x	0	1	2	3	4
F(x)	2	5	8	9	12

Find:

(a) linear spline form

(b) Lagrange polynomial of degree 4

(c)f(0.1)and f(3.5) using Newton's forward and backward

Problem number (2)

(a)Deduce the approximating form of f '(x) by central difference.

(b)From the following table

x	0	0.5	1	1.5	2	2.5	3
F(x)	2	2.7	3.1	5.2	7.2	9	11

Find $D_{2,2}$ (Ricardson extrapolation) where $D_{n,1} = a(\frac{h}{2^{n-1}})$, a(h) is central approximation of f '(1) and h=1.

Problem number (3)

(a) Deduce the form of truncation error by trapezoidal rule

(b)Find an approximate value of $\int_0^1 \frac{1}{1+x^2}\,dx$ by using

(i) Trapezoidal rule

(ii) Simpson rule

(iii)Gaussian three-point quadratic

(v) Find $R_{2,2}$ (Richardson extrapolation)

Problem number (4)

(a)Deduce the form of solution of Possion equation $u_{xx}+u_{yy}=f(x,y)$ by using finite difference method.

P.T.O.

(b) Use finite difference method to find the solution of
$u_t = u_{xx}$, $0 \le x \le 1$ and u(x,0)=0, u(0,t)=1, u(1,t)=0

Problem number (5)

(a) From directional encoding for digital image of curve starting at (0,0) and represent by the sequence of codes 7701 .
(i) Represent these codes graphically in xy-plane.
(ii) From its Coordinate find quadratic spline interpolation form.

(b) Solve the following boundary value problem
$y'' + x\,y = x$, $0 \le x \le 1$, y(0)=0 and y(1)=0 by using linear shooting method

Dr: M.S.Nayle
With my best wishes

١/٢٥ ق فوى

Tanta University

Elec. Power and Machines Engineering Department

Faculty of Engineering

Course Title	: Electromagnetic Fields		Course Code : EPM2104
Date	: Jan 25th 2010 (First term)		Allowed time : 3 hrs
Total Marks : 85		No. of Pages: (2)	Year : 2nd Power

Remarks: (answer the following questions... assume any missing data... answers should be supported by sketches...etc)

Question(1)

(a=6 Marks, b=15 Marks)

a) Derive an expression for the electric flux density D at a point (0,0,z) due to an infinite sheet of charge on the plane z = 0, having a uniform charge density ρ_s C/m^2.

b) Three concentric cylindrical surfaces have radii ρ_1 = 2.5 m, ρ_2 = 3.5 m, ρ_3 = 5 m. The three cylindrical surfaces carry uniform surface charge densities of : ρ_{s1} = 10 nC/m^2 , ρ_{s2} = -30 nC/m^2 , ρ_{s3} = ρ_s respectively.

i) Find D at ρ = 2, 3, 4 m

ii) Find ρ_s such that D = 0 at ρ = 6 m

Question(2)

(6=5 Marks, b=15 Marks)

a) Using Ampere's circuital law derive a mathematical expressions for the magnetic field intensity H from $\rho = 0$ to $\rho = \infty$ of an infinitely long coaxial transmission line carrying a uniformly distributed total conductor current I in the inner solid conductor and – I in the outer hollow conductor, given that the inner solid conductor radius is h and the hollow outside conductor inner radius is b and its outer radius is c. Sketch H versus ρ from 0 to ∞.

b) Two parallel plates of a capacitor spaced by three different dielectric materials with relative permittivities 5, 4, 2 and thickness 2, 3, 1 mm respectively. If each plate has an area of 4 cm^2 and the total applied voltage is 500 V, calculate:

i) The total capacitance.

ii) The electric field intensity in each dielectric material.

iii) The voltage across each dielectric material.

iv) The energy stored in each dielectric material.

P.T.O.

Question(3)

(a=6 Marks, b=15 Marks)

a) Defining each term used, write the Maxwell's equations in its integral form for static Fields.

b) Using a cylindrical coordinates ($0 \ll \rho \ll a$, $0 \ll \Phi \ll \pi$, $0 \ll z \ll z$), find the electric field intensity and the stored energy in this electric field over this cylinder if:

i) $V = \frac{\rho V_o}{2a}$

ii) $V = V_o \cos^2 \Phi \left(\frac{\rho}{a}\right)$

Question(4)

(a=6 Marks, b=16 Marks)

a) Aided with clear sketches, derive expressions that determine the perfect dielectric material properties at the surface between two dielectric materials when they are placed in an external electric field using the boundary conditions.

b) Calculate the force produced on a square loop ABCD in z = 0 plane carrying a current of 5 mA flowing from D to C to B to A to D (clockwise direction) due to a current carrying conductor of 10 A and placed on the plane z = 0, X = 0, and its direction is in the +ve y direction, where coordinates of the square loop are: A(2,0,0), B(4,0,0), C(4,2,0), and D(2,2,0).

Good Luck

Prof. M.A.El-Khazendar

Course Examination Committee

Prof. M.A. El-Khazendar

Dr. M.K. Elnemr

Prof. E.M. Rashad

Dr. M. Abd Elaziz

Course Coordinator: Prof. M.A. El-Khazendar

TANTA UNIVERSITY

Electrical Power and Machines Department

Faculty of Engineering

Final EXAM 2009/2010 - First Term

Course	Energy Conversion (EPM2106)	Time Allowed	3 hours
Students	2nd Year (Electrical Power and Machines)	Total Mark	90
Date	Sat. 23rd January, 2010	Number of pages	4

Attempt ALL the following questions and problems:

- *Clarify your answer with the suitable sketches as you can.*
- *Assume any missed data reasonably.*

The first question (15 marks)

Choose the correct answer/answers for the following statements. It is sufficient to write down the question number followed by your choice/choices in your answer sheet:

1. Higher magnetic permeability leads to
   A) higher inductance
   B) lower inductance
   C) more flux leakage
   D) lower iron losses

2. Iron losses depend on
   A) electric supply frequency only
   B) flux level only
   C) area of hysteresis loop of the material only
   D) all the of the above choices

3. Compared with magnetic materials, permanent magnetic material has higher values of
   A) magnetic field intensity (H)
   B) flux density (B)
   C) relative permeability (μ_r)
   D) current

4. Mutual inductance between two coils increases with increase of:
   A) angle between their axes
   B) distance between them
   C) their currents
   D) none of the above choices

5. For mutually coupled coils, if currents are both entering at the dot-marked terminals, coil fluxes
   A) are additive
   B) are subtractive
   C) increase
   D) cancel each other

6. For ideally coupled coils, coupling coefficient is
   A) zero. B) unity C) infinity D) between zero and unity

7. The stored energy in magnetically coupled coils *does not* depend on
   A) coupling coefficient between coils.
   B) angle between coils
   C) direction of motion
   D) direction of currents

8. For dc excitation, induced emf is
   A) always zero
   B) only transformer voltage
   C) both speed and transformer voltages
   D) only speed voltage

9. A rotating system with salient stator and rotor, electromechanical energy conversion is possible if:
   A) only stator winding is excited.
   B) only rotor winding is excited.
   C) both stator and rotor windings are excited.
   D) either stator or rotor winding is excited.

10. For a rotating system with salient stator and cylindrical rotor:
   A) only stator self inductance is function of rotor position
   B) rotor self inductance is NOT a function of rotor position
   C) both rotor self inductance and mutual inductance are functions of rotor position
   D) all inductances (self and mutual) are functions of rotor position

11. A rotating system with ac excitation for stator and dc excitation for the rotor is called a
   A) reluctance machine B) synchronous machine
   C) induction machine D) dc machine

12. A two-phase winding excited from a two-phase gives
   A) a single rotating mmf
   B) two rotating mmfs with anti-direction
   C) stationary mmf
   D) pulsating mmf.

13. Renewable sources of energy has the advantage of
   A) low running cost
   B) low initial (capital) cost.
   C) cheap equipments
   D) continuous availability

14. To obtain higher voltages, solar cells are connected
   A) in parallel
   B) in series
   C) in series-parallel combination
   D) with a battery of higher voltage

15. The most effective quantity on the available mechanical energy at shaft of a wind turbine is:
   A) air density B) turbine diameter C) wind speed D) turbine power coefficient

The second question (10 marks)	
Which of the following statements is correct? You can write down in your answer sheet the question number followed by either ✓ or X mark.	
1.	Inductance of a coil increases with increase in magnetic reluctance of its core.
2.	For a linear magnetic system, coil inductance does not depend on its current
3.	Motional (speed) voltage increases with increasing supply frequency
4.	Mutual inductance between two coils depends on their self inductances
5.	For linear magnetic system stored energy equals co-energy.
6.	Direction of electromagnetic torque is to increase inductance
7.	Transformer voltage depends on coil inductance variation with position.
8.	The mutual inductance between two magnetically coupled coils *must be* lower than the smaller self inductance of each coils
9.	For doubly excited rotating system, it is necessary to have some saliency for possible electromechanical energy conversion.
10.	Distributed winding provides more sinusoidal mmf space variation

The third question (22 marks)	
1.	Discuss what is meant by magnetic flux leakage and fringing in the magnetic circuits; then show how to minimize them. (4 marks)
2.	With the aid of BH curve of a permanent magnet material show: (4 marks) a) the effect of air gap length on the position of the operation point b) the point of maximum energy product
3.	Explain the dot convention employed to determine the polarity of the mutually induced voltages. Then show how it can be determined experimentally. (4 marks)
4.	For a singly-excited rotating electromechanical energy converter, derive a relation for the developed torque in terms of both stored energy and co-energy. (5 mark)
5.	With the aids of current-flux linkage curves, derive how to determine energy converted into mechanical motion from a certain position to another. (5 marks)

The fourth question (28 marks)	
1.	For a doubly-excited electromechanical energy conversion device of cylindrical stator and rotor: a) Sketch the space variation of self and mutual inductances. (2 marks) b) Derive a general expression for the electromagnetic torque acting on the rotor. (6 marks) c) Show all the possible electrical machines can be obtained. (2 marks)
2.	Show the MMF space distribution a dc-excited coil of uniform air gap, if the conductors are : a) concentrated b) distributed in 8 slots (4 in each side). Which of the two cases are preferred? Why ? (4 marks)

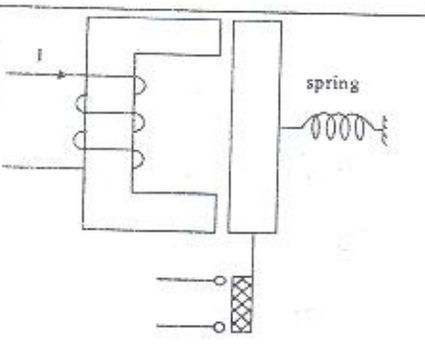
3.	Both analytically and graphically, show that balanced three-phase windings excited by balanced three-phase currents, produce a single rotating MMF wave. (4 marks)
4.	Give brief notes on advantages and disadvantages of renewable sources of energy. (4 marks)
5.	Using suitable clarifications of sufficient data, show the following: (6 marks) a) Solar cell characteristics b) Wind turbine characteristics c) Components of a photovoltaic generating system. d) A wind-energy-based generating system.

The fifth question (15 marks)

1. The relay shown in figure has mean core length of 40 cm. The air-gap lengths are 2 mm each. The coil has 1000 turns. The core is made of a steel having B-H relation given in the following table:

H (AT/m)	400	500	700	900	1100	1400
B (T)	0.4	0.6	0.8	1.0	1.1	1.2

A flux density of 0.9 Tesla is required to actuate the relay. Find the necessary coil current. (5 marks)



2. The self and mutual inductances of two exciting coils of a multiply-excited translational system are:

$$L_{11} = L_{22} = \frac{3.6}{1+2x} \quad \text{and} \quad L_{12} = L_{21} = \frac{1.8}{1+2x}$$

The two coils are connected in series to a voltage supply of 100 cos(314t). If the displacement x is held at 40 cm, find

a) current (as a time expression) (5 marks)

b) average force (5 marks)

Good Luck and best wishes

Prof. Essam Eddin M. Rashad

TANTA UNIVERSITY

FACULTY OF ENGINEERING

DEPARTMENT OF MECHANICAL POWER ENGINEERING

EXAMINATION (2 YEAR) STUDENTS OF Electrical Power Engineering

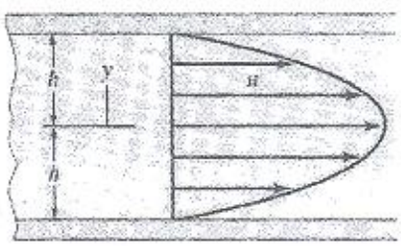
COURSE TITLE: Mechanical Engineering			COURSE CODE: MEP2141
DATE:	TERM: FIRST....	TOTAL ASSESSMENT MARKS: 75	TIME ALLOWED: 3.. HOURS

الإمتحان مكون من 6 أسئلة فى ورقتين

PROBLEM # 1 (10 mark)

The velocity distribution for the flow of a Newtonian fluid between two wide, parallel plates is given by the equation

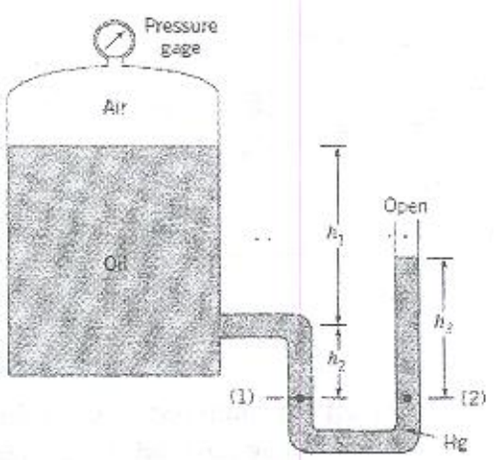
$$u = \frac{3V}{2}\left[1 - \left(\frac{y}{h}\right)^2\right]$$



Where V is the mean velocity. The fluid has a viscosity of 0.04 pa. s. When V= 2 m/s and h = 0.1 m determine: (a) the shearing stress acting on the bottom wall, and (b) the shearing stress acting on a plane parallel to the walls and passing through the centerline (mid plane).

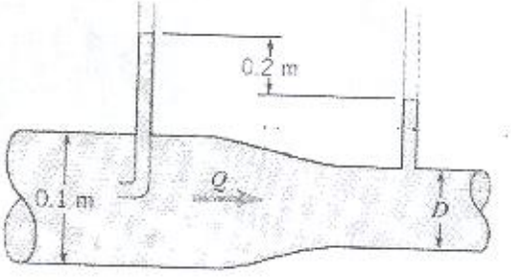
PROBLEM # 2 (10 mark)

A closed tank contains compressed air and oil $SG_{oil} = 0.9$ as is shown in Figiuer U-tube manometer using mercury $SG_{Hg} = 13.6$ is connected to the tank as shown. For column heights $h_1 = 36$ cm, $h_2 = 6$ cm and $h_3 = 9$ cm determine the pressure reading of the gage.



PROBLEM # 3 (10 mark)

Water flows through the pipe contraction shown in Fig. For the given 0.2-m difference in manometer level, determine the flow rate as a function of the diameter of the small pipe, D.



PROBLEM # 4 (10 mark)

Automobile engine that operates on four-stroke produced the brake power 94 kW at speed 2000 rpm, number of cylinder 6 cylinder, cylinder diameter 80 mm and stroke length 108 mm.

Calculate:

a- Stroke volume

b- Engine capacity

c- Brake mean effective pressure

d- Torque

PROBLEM # 5 (15 mark)

A plane wall, 0.15m thick, internally generates heat at a rate of 6×10^4 W/m^3. One side of the wall is insulated and the other side is exposed to an environment at 25°C. The heat transfer coefficient between the wall and the environment is 750 W/(m^2.K). The thermal conductivity of the wall is 20 W/(m.K). Calculate the maximum temperature in the wall.

PROBLEM # 6 (15 mark)

A centrifugal pump deliver 0.2 m^3/s discharge of the water from suction reservoir to delivery reservoir. The static suction head 5 m blow the atmospheric pressure and static delivery head 18 m above the atmospheric pressure. Diameter of suction and delivery pipe is 20 cm and length of suction pipe 5.5 m and length of delivery pipe is 20 m. the friction factor of pipe material 0.04 m. Determine the shaft power input to the pump. Given pump efficiency 0.86.

انتهت الاسئله

C/C

قوى

Tanta University

Department: Elec. Power and Machines Engineering
Total Marks: 70 Marks

Faculty of Engineering

Course Title: Civil Engineering (Second Paper) Course Code: CSE2155
Date: 24th January 2011 (First term) Allowed time: 3 hrs

Year: 2nd Electrical Eng.
No. of Pages: (1)

- Assume any missing data
- Answers should be supported by sketches

الورقة الثانية (25 درجة)

السـؤال الأول:- (9 درجات)

أ- عرف التربة موضحا كيف تكونت؟

ب- ما المقصود بفقاعة الضغط داخل التربة؟ وما هو تأثير أبعاد الأساس على شكلها؟ (1.5 درجة)

ت- وضح كيف يمكن تصنيف التربة طبقا لقطر حبيباتها ؟ (1.5 درجة)

ث- ماهى أهم الفروق بين التربة المتماسكة والتربة الغير متماسكة؟ أذكر أمثلة على بعض أنواع تلك التربة. (1.5 درجة)

ج- أذكر ما تعرفه عن أنواع التربة ذات المشاكل موضحا الاضرار التى تنشأ عند التأسيس عليها. (1.5 درجة)

ح- مافائدة استخدام السملات لكل من الأساسات السطحية والأساسات العميقة. (1.5 درجة)

السـؤال الثانى:- (9 درجات)

وضح فقط بالرسومات المتقنة مع وضع كافة البيانات على الرسم كلا مما ياتي:

أ- التوزيع المثلثى لمكونات التربة فى الحالة الجافة والمشبعة والغير مشبعة. (1.5 درجة)

ب- دورة انتقال الأحمال من المنشأ الى التربة. (1.5 درجة)

ت- توزيع الاجهادات داخل التربة خلال مستوى رأسى يمر بمنتصف الأساس. (1.5 درجة)

ث- أنواع الأساسات السطحية، مع توضيح متى يتم استخدام كل نوع منها. (1.5 درجة)

ج- الحالات المختلفة لشكل انهيار التربة أسفل الأساس نتيجة ضعف قدرة تحملها للاجهادات. (1.5 درجة)

ح- الأنواع المختلفة للخوازيق المستخدمة كأساسات عميقة. (1.5 درجة)

السـؤال الثالث:- (7 درجات)

أ- أذكر أنواع الهبوط الذى يحدث للتربة أسفل المنشآت.

ب- وضح لماذا يعتبر الهبوط النسبى أكثر خطورة على المنشأ من الهبوط الكلى. (1 درجة)

ت- ما هى قيم الهبوط الكلى والهبوط النسبى المسموح بها للأساسات طبقا للكود المصرى لتصميم الاساسات. (1 درجة)

ث- اذا علمت بوجود كابل كهربائى على عمق 2 متر يمر أسفل منتصف قاعدة برج كهربائى سيتم انشاؤها بأبعاد 2.0 * 2.0 متر على سطح الأرض بحيث تعطى اجهادا أسفلها مباشرة مقداره 1.0 كجم/ سم^2، وكان السطح السفلى لطبقة التربة التى يمر بها الكابل تقع على عمق 4.0 متر تحت سطح الأرض (أى أن سمك الطبقة يساوى 4.0 متر)، وكان معدل التغير الحجمى لهذه الطبقة هو 0.02 سم^2/كجم، فالمطلوب حساب مقدار الهبوط المتوقع للكابل نتيجة انضغاط تلك الطبقة. (1 درجة)

(4 درجة)

أطيب الأمنيات بالنجاح والتفوق

د. أحمد فاروق

Tanta University

Department: Physics and Engineering Mathematics
Total Marks: 85 Marks

Faculty of Engineering

Course Title: Engineering Mathematics 3(a) | Course Code: PME2109 | Year: 2nd
Date: Jan. 17th 2011 (First term) | Allowed time: 3 hrs | No. of Pages: (2)

Remarks: (answer the following problems… assume any missing data… answers should be supported by sketches)

Problem number (1) **(20 Marks)**

a) The following data of the velocity of a body is given as a function of time in the following table. **10 Marks**

t (s)	4	7	10	15
$v(t)$ (m/s)	22	24	37	46

What is the best estimate of the distance in meters covered by the body from $t=5$ to $t=15$ using combined Simpson's rule and Trapezoidal rule.

b) Consider the following approximation: **10 Marks**

$$f'(0) \approx \frac{4f_1 - f_2 - 3f_0}{2h}$$

1. Derive this approximation using Taylor's Theorem.
2. Give the accuracy of the above approximation. Your answer should be something like $O(h^?)$?
3. Use Richardson extrapolation technique to reduce the truncation error to an order $O(h^4)$.
4. Let $f(x)=x^4$: find an approximate value of $f'(0)$ with the result given by part 3 , using $h=0.1$.

Problem number (2) **(15 Marks)**

a) Consider the following data **5 Marks**

x	1.4	1.8	2.2
$f(x)$	3.12	2.81	1.70

- Construct the divided difference table for the data.
- Obtain Newton's interpolating polynomial o estimate $f(1.6)$.

b) Use cubic spline to approximate the value of $f(1.6)$. **5 Marks**

c) Comment on the sentence "Polynomial interpolating continuous function at equally spaced points may not converge to function as number of data points and polynomial degree increases". (Hint: this is best illustrated by Runge's phenomena). **5 Marks**

P.T.O.

TANTA UNIVERSITY

Electrical Power and Machines Department

Faculty of Engineering

Final EXAM 2010/2011 - First Term

Course	Energy Conversion (EPM2106)	Time Allowed	3 hours
Students	2nd Year (Electrical Power and Machines)	Total Mark	90
Date	Wed, January 12th , 2011	Number of pages	4

Attempt ALL the following questions and problems:

- *Clarify your answer with the suitable sketches of complete data as you can.*
- *Assume any missed data reasonably.*

The first question (14 marks)

Choose the correct answer/answers for the following statements. It is sufficient to write down the question number followed by your choice/choices in your answer sheet:

1. Nonlinear magnetic characteristics leads to:
   A) distorted magnetizing current B) higher inductance
   C) higher power loss D) inducing an emf
2. Iron losses depend on
   A) electric supply frequency only B) flux level only
   C) area of hysteresis loop of the material only D) all the of the above choices
3. Permanent magnetic material has relative permeability (μ_r) of
   A) infinity B) unity
   C) zero D) negative
4. Mutual inductance between two coils ***does not*** depend on
   A) angle between their axes B) distance between them
   C) their currents D) material of magnetic path between them
5. For mutually coupled coils, if currents are both leaving at the dot-marked terminals, coil fluxes
   A) are additive B) are subtractive
   C) increase D) cancel each other
6. For perpendicular coupled coils, coupling coefficient is
   A) zero. B) unity C) infinity D) between zero and unity
7. For dc excitation, induced emf is
   A) always zero B) only transformer voltage
   C) both speed and transformer voltages D) only speed voltage

Please Turn Over

8.	A system with cylindrical stator and rotor, electromechanical energy conversion is possible if: A) only stator winding is excited. B) only rotor winding is excited. C) both stator and rotor windings are excited. D) either stator or rotor winding is excited.
9.	For a rotating system with a cylindrical stator and salient rotor: A) mutual inductance is NOT function of rotor position B) rotor self inductance is NOT a function of rotor position C) both rotor and rotor self inductances are functions of rotor position D) all inductances (self and mutual) are functions of rotor position
10.	A rotating system with ac excitation for stator and shorted rotor circuit is called a A) reluctance machine B) synchronous machine C) induction machine D) dc machine
11.	A three-phase winding excited from a three-phase supply gives A) a single rotating mmf B) two rotating mmfs with anti-direction C) stationary mmf D) pulsating mmf.
12.	Conventional fossil sources of energy has the advantage of A) low running cost B) safe operation. C) economically feasible D) continuous availability forever
13.	To obtain higher currents for the same voltage solar cell modules are connected A) in parallel B) in series C) in series-parallel combination D) with a battery of higher capacity
14.	The most effective quantity on the available mechanical energy at shaft of a wind turbine is: A) air density B) turbine diameter C) wind speed D) turbine power coefficient

The second question (10 marks)

Which of the following statements is correct? You can write down in your answer sheet the question number followed by either ✓ or X mark.

1.	To reduced hysteresis losses, magnetic circuit is made of isolated laminations.
2.	For non-magnetic materials, the B-H relation is linear.
3.	Polarity of induced voltage due to self inductance depends on currents in coupled coils.
4.	Direction of developed electromechanical torque tends to increase relucance.
5.	Mutual inductance between two coils depends on their self inductances
6.	Coupling coefficient between coils increases with increase in leakage flux
7.	Transformer voltage depends on supply frequency
8.	For nonlinear magnetic system stored energy equals co-energy.

Please Turn Over

9.	For doubly excited rotating system, it is NOT necessary to have saliency for possible electromechanical energy conversion.
10.	Concentrated winding provides more sinusoidal mmf space variation

The third question (24 marks)

1. Give detailed notes on the properties of magnetic materials. (4 marks)

2. For a magnetic circuit that contains a part of a permanent magnet material and an air-gap, derive the necessary condition to minimize the volume of the magnetic material for a desired value of the flux density in the air-gap. (4 marks)

3. Derive an expression for mutual inductances between two magnetically-coupled coils in terms of their self inductances. (4 marks)

4. For two magnetically-coupled coils, show that the total stored energy W_t is given by:

$$W_t = \tfrac{1}{2} L_{11} I_1^2 + \tfrac{1}{2} L_{22} I_2^2 \pm M I_1 I_2$$

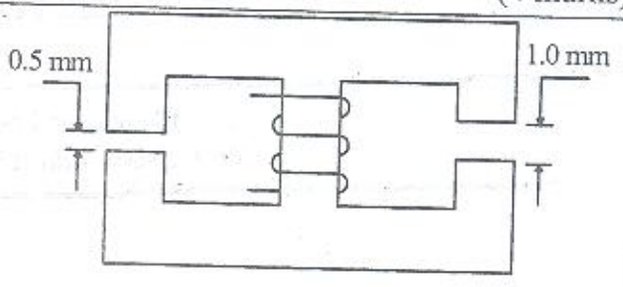
where I_1 and I_2 are the currents in the two coils.
L_{11} and L_{22} are the self-inductances of the two coils.
M is the mutual inductance between the two coils. (4 mark)

5. If the relationship between total flux linkage "λ" and current "i" of a magnetic circuit is given as

$$\lambda = \frac{6i}{2i+1}$$

Determine the energy stored in the magnetic field when λ is varied from zero to 2 Wb.t (4 marks)

6. The coil, wound on the center limb of the magnetic circuit shown in figure has 250 turns and a resistance of 3 Ω. The uniform cross-section of the magnetic circuit is 10 cm^2. The relative permeability of the iron part of the circuit is infinitely high. It is required to produce a flux of 25 mWb in the left air-gap. Determine



a) the value of the dc voltage that to be applied to the coil terminals. (2 marks)
b) the value of the flux in the right air-gap. (2 marks)

The fourth question (20 marks)

1. With the aid of suitable mathematical relations, define what is meant by transformer and rotational voltages. (4 marks)

2. Sketch the space variation of self and mutual inductances of a rotating system of salient stator and cylindrical rotor. (3 marks)

3. For a translational electro-mechanical energy conversion system, derive expressions for current, flux linkage and force in terms of stored energy and coenergy. (4 marks)

Please Turn Over

4.	With the aids of current-flux linkage curves, derive how to determine energy converted into mechanical motion from a certain position to another. (4 marks)
5.	A doubly-excited rotating system with saliency associated with both the stator and the rotor. The stator self inductance has maximum and minimum values of 0.4 H and 0.2 H respectively, while maximum and minimum values of the rotor self inductance are 0.6 H and 0.4 H respectively. The maximum value of the mutual inductance between the two coils is 0.2 H. Find an expression for the torque acting on the rotor as a function of the angular position when stator current is 1 A and rotor current is 0.5 A. Sketch the variation of torque against rotor angular position. (5 marks)

The fifth question (22 marks)

1.	Derive a general expression for the electromagnetic torque acting on the rotor of an AC doubly-excited device. The device has a cylindrical stator and a salient-pole rotor. Then show how can this device be used as: (4 marks) 1- a synchronous machine. (2 marks) 2- a reluctance machine. (2 marks)
2.	Show that the single-phase winding excited from an AC supply produces a pulsating MMF wave. Then show that this mmf can be viewed as the resultant of two rotating mmfs in opposite directions. (6 marks)
3.	Give detailed notes on sources of electrical energy (4 marks)
4.	Only using suitable diagrams of sufficient data, show the following: a) A photovoltaic generating system. (2 marks) b) A wind-energy-based electric generating system. (2 marks)

Good Luck and best wishes
Prof. Essam Eddin M. Rashad

Elec. Power and Machines Engineering Department

Tanta University

Faculty of Engineering

Course Title	: Electromagnetic Fields	Course Code	: EPM2104
Date	: Jan 15th 2011 (First term)	Allowed time	: 3 hrs
Total Marks	: 85	No. of Pages: (2)	Year : 2nd Power

Remarks: (answer the following questions... assume any missing data... answers should be supported by sketches...etc)

ANSWER ALL QUESTIONS

Question(1) *(a = 5 Marks, b = 12 Marks)*

a) Using Gauss's law, derive an expression for the electric field intensity **E** at a point $P(r,\theta,\Phi)$ due to a point charge Q located at the origin.

b) Three concentric cylindrical surfaces have radii : $\rho_1 = 2$ m, $\rho_2 = 4$ m and $\rho_3 = 6$ m carry uniform charge densities of : $\rho_{s1} = 20$ nC/m^2, $\rho_{s2} = -4$ nC/m^2, and ρ_{s3} nC/m^2 respectively.

i. Calculate **D** at r = 1, 3, and 5 m

ii. Compute ρ_{s3} such that **D** = 0 at $\rho = 7$ m

Question(2) *(a = 5 Marks, b = 12 Marks)*

a) Aided with clear sketches and defining each term used, derive the potential difference due to an infinite line charge between two points A and B.

b) Two spherical concentric conductors with the inner spherical conductor is solid and has a radius a and its voltage is V_1. The outer spherical conductor has inner radius b and outer radius c and it has a voltage V_2. Find the charges Q_1 and Q_2 for the following conditions:

i. The two conductors are isolated.

ii. The inner conductor is grounded.

iii. The outer conductor is grounded.

iv. The inner conductor is not charged.

Question(3) *(a = 6 Marks, b = 11 Marks)*

a) Using Ampere's circuital law derive a mathematical expressions for the magnetic field intensity **H** from $\rho = 0$ to $\rho = \infty$ of an infinitely long coaxial transmission line carrying a uniformly distributed total conductor current I in the inner solid conductor and – I in the outer hollow conductor, given that the inner solid conductor radius is h and the hollow outside conductor inner radius is b and its outer radius is c.

Sketch H versus ρ from 0 to ∞.

P.T.O.

b) Two parallel plates spaced by three different dielectric materials with relative permitivities 5, 8, 12 and thicknesses 2, 5, 3 mm respectively. If each plate has an area of 3 cm and the total applied voltage is 1000 V, calculate:

i. The total capacitance.
ii. The electric field intensity in each dielectric material
iii. The voltage across each dielectric material.
iv. The energy stored in each dielectric material.

Question(4)

(a = 5 Marks, b = 12 Marks)

a) Aided with clear sketches, derive an expression for the magnetic field intensity at point P due to a current carrying conductor of finite length.

b) The z = 0 plane is a perfectly conducting surface. A point charge of 5 nC is located at A(4,3,1), and a point charge of – 8 nC is at B(2,-5,4), all in free space. Calculate V at a point midway between the two point charges.

Question(5)

(a = 5 Marks, b = 12 Marks)

a) Aided with clear sketch, apply the boundary conditions on the surface separating two perfect dielectric materials of permittivity ε_1 and ε_2 to determine the relations between D_1 and D_2 and between E_1 and E_2 in terms of θ_1 , ε_1 , θ_2 and ε_2 .

b) Calculate the force produced on a square loop ABCD, in the z = 0 plane, carrying a current of 2 mA flowing in the anticlockwise direction due to a current carrying conductor of 15 A and placed on the plane z = 0, X = 0, and its direction is in the -ve y axis, where coordinates of the square loop are: A(1,0,0), B(3,0,0), C(3,2,0), and D(1,2,0).

Permittivity of free space $\varepsilon_o = 8.85 \times 10^{-12}$ F/m , Permeability of free space $\mu_o = 4\pi \times 10^{-7}$ H/m

Good Luck

Prof. M.A.El-Khazendar

Course Examination Committee

Prof. M.A. El-Khazendar

Prof. E.M. Rashad

Dr. S. Alam

Dr. R. El-Sehiemy

Course Coordinator: Prof. M.A. El-Khazendar

Problem number (3) **(15 Marks)**

a) Derive the following multi-step method: **10 Marks**

$$y_{i+1} = a_1 y_i + h[b_1 f(x_i, y_i) + b_2 f(x_{i-1}, y_{i-1})]$$

- Choose the constants a_1, b_1 and b_2 so that this method has the highest order of local truncation error.
- Apply this technique to solve the IVP $y' = x - y + 1,\ y(0) = 1$ at $y(0.2)$

b) Consider the following system **5 Marks**

$$y_1^{(1)}(x) = y_2 - y_3^2,\quad y_2^{(1)}(x) = x + y_1 + y_3,\quad y_3^{(1)}(x) = y_2 - y_1^2$$

$$y_1(0) = 1,\ y_2(0) = 0,\ y_3(0) = 1.$$

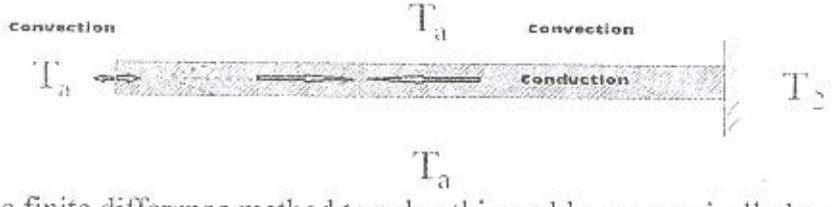
Approximate $Y(0.1)$ by taking a single step of size 0.1 using RK2 method. (Note that: $Y(x) = [y_1(x), y_2(x), y_3(x)]^t$).

Problem number (4) **(35Marks)**

a) The conservation of heat can be used to develop a heat balance for a long, thin rod by the following BVP: **15 Marks**

$$T'' + k(T_a - T) = 0,\ \frac{dT}{dx}(0) = T_1 \text{ and } T(L) = T_2$$

For a 10 m rod with $T_a = 200$, $T_1 = 0$, $T_2 = 400$ and $k = 0.05$.



In details, use finite difference method to solve this problem numerically by dividing the rod into five equal parts.

b) The displacement of a stretched square membrane subjected to a uniform load is governed by $\nabla^2 u = -10x,\ 0 \le x \le 3,\ 0 \le y \le 3$ and $u(x, y) = 20x + 30y$, on the boundaries. Take $h = k = 1$, find the approximate displacement using finite-differences. **10 Marks**

c) Find an approximate solution to the wave equation **10 Marks**

$\frac{\partial^2 u}{\partial t^2} = 4\frac{\partial^2 u}{\partial x^2},\ x \in (0,1),\quad 0 \le t \le 1$, that satisfies the conditions:

$u(0, t) = 0,\ u(1, t) = 0,\ 0 \le t \le 1,$ and the initial conditions $u(x, 0) = \sin \pi x,\ u_t(x, 0) = 0,\quad 0 \le x \le 1$. Take $h = 0.1$ and $k = 0.05$, for only two levels.

With my best wishes

Dr. Waheed Kamal Zahra

عفو يا كريم

Tanta University

Department: Elec. Power and Machines Engineering
Total Marks: 90 Marks

Faculty of Engineering

Course Title: Electrical Power Engineering (1)	Course Code: EPM2105	Year: 2nd
Date: February 22th 2011	Allowed time: 3 hrs	No. of Pages: (2)

Remarks: (answer the following questions... assume any missing data... answers should be supported by sketches...etc)

Problem number (1) **(10 Marks)**

A three-phase double circuit line has the conductors at the corners of a hexagon as shown in Figure (1). (i) **Find** the capacitance and inductance per phase per km in terms of side D and conductor radius r; (ii) If D = 3.5m and r = 1.09 cm **find** the capacitance per phase per km and capacitance per conductor per km; (iii) If the line voltage is 132 km and line length is 100 km, **find** the charging current and charging megavolt ampere.

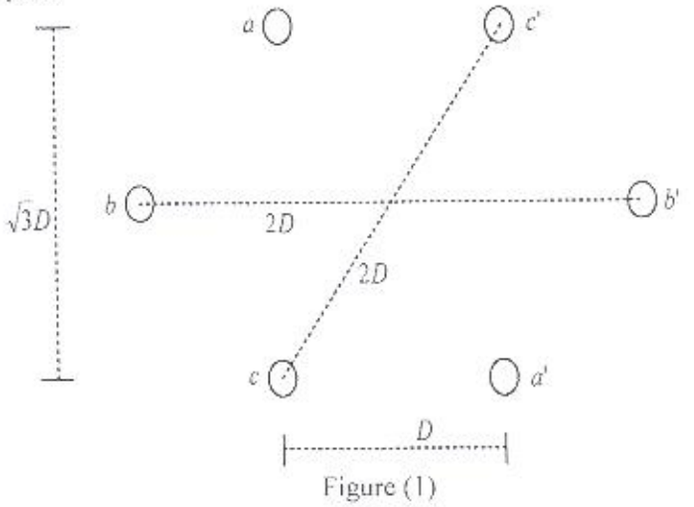


Figure (1)

Problem number (2) **(20 Marks)**

a) **Define** the following terms, illustrate your answer with suitable sketch:

i. Skin Effect.
ii. Transposition of overhead transmission line.
iii. Ferranti Effect.
iv. Puncture and flashover voltage of an insulator.

b) The per unit length parameters of a 220 kV, 200 km, 50 Hz, three-phase transmission line are $y = j7.5\times10^{-6}\ S/km$ and $z = (0.1 + j0.5)\Omega/km$. The line supplies a 100 MW load at 0.8 lagging power factor. **Determine**: (i) the line constants ABCD, using π model; (ii) the line voltage regulation; (iii) the line efficiency; (iv) the load impedance at maximum power received to load and then calculate maximum power.

Problem number (3) **(20 Marks)**

a) **Discuss why:**

i. Pocelain is the most commonly used material for insulators.
ii. Pin insulators are used for low voltages while suspension insulators are used for high voltages.
iii. The voltage distribution across the units of a string insulator is not uniform.

b) For the a string insulator shown in Figure (2), find value of c_1, c_2 and c_3 for uniform distribution distribution over the string.

P. T. O.

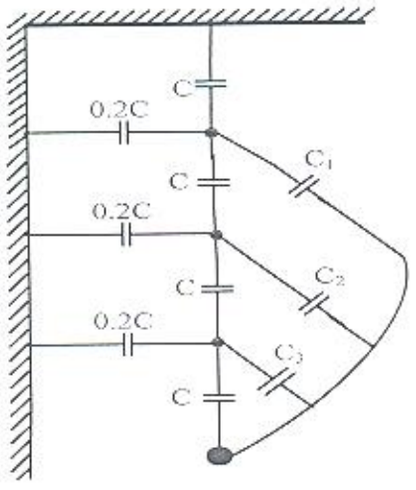


Figure (2)

Problem number (4) **(20 Marks)**

a) Derive a formula for mechanical tension at general point p(x,y) as a function of mechanical tension at lowest point of conductor supported at two towers with equal height, and then determine the mechanical tension at the two supports. Finally evaluate the actual conductor length between the two supports.

b) A transmission line over a hillside where the gradient is 1:20 is supported by two 22 m height towers with a distance of 300 m between them. The lowest conductor is supported at 2 m below the top of each tower. Find the clearance of the conductor from the ground if the conductor weight is 1.0 kg/m, the maximum tension is 3000 kg and safety factor is 2.0.

Problem number (5) **(20 Marks)**

A DC two-wire ring distributor with interconnector between B and D is shown in Figure (3). It is fed from 250 V at A and the resistance of sections AB, BC, CD, DE, EA and BD is 0.1 Ω. Find: (i) the current through distribution sections; (ii) the voltage at each load point; (iii) the Distributor efficiency.

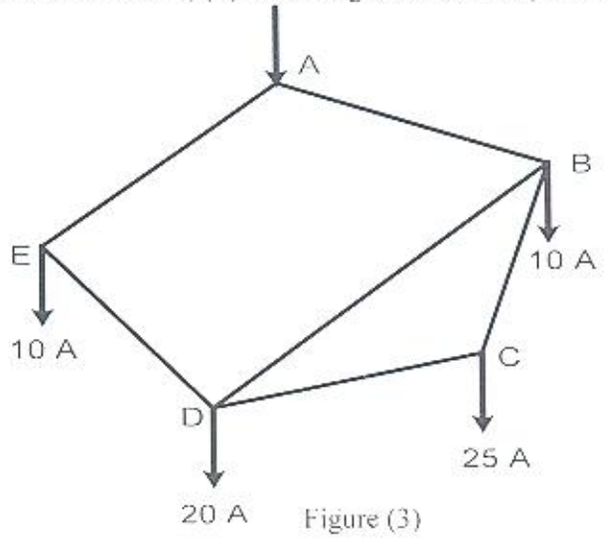


Figure (3)

(With My Best Wishes)
Dr. Ibrahim B. M. Taha

هوى

Tanta University

Department: Elec. Power and Machines Engineering
Total Marks: 70 Marks (for the 2 pages)

Faculty of Engineering

Course Title: Civil Engineering	Course Code:	Year: 2nd
Date: January 24, 2011 (First term)	Allowed time: 3 hrs	No. of Pages: (2)

Remarks: (answer all the following questions, and assume any missing data)
(answers should be supported by sketches)

السؤال الأول (٢٠ درجة)

أ- ما هي العوامل التي يتوقف عليها اختيار مقياس الرسم المناسب لخريطة ؟ **(٥ درجات)**

ب- وضح بالرسم فقط كل من الآتي : زاوية الأنحراف الرأسي – الاحداثيات الجيوديسية لنقطة – الاجزاء الرئيسية في تلسكوب ميزان القامة – العلاقة بين الزاوية الرأسية والزاوية السمتية. **(٥ درجات)**

ج- المطلوب تصميم ورسم مقياس رسم تخطيطي ١ : ٥٠٠ يقرأ مباشرة إلى اقرب ٠,٦ ذراع معماري ثم بين عليه خطا طوله ٧٤,٤ ذراع معماري. **(١٠ درجات)**

السؤال الثاني (١٥ درجة)

أ- أشرح كيف يمكنك ايجاد فرق المنسوب بين نقطتين في موقع عمل تعذر توافر ميزان قامة فيه ووضح أجابتك بالرسم. **(٥ درجات)**

ب- أخذت القراءات الآتية بالأمتار في ميزانية أجريت في موقع كوبري علوي وكانت كما يلي:

٢,٣٣ – ٣,٢٢ – ١,٦٨ – ٢,١٦ – ٢,٥٤ – ٢,٥٧ – ١,٩٦ – ٣,١٤ – ٢,٢٣ – ٢,٧٨ – ٢,٦٥ – ٣,٤٨ – ٢,٥٩ – س – ١,٧٩.

فإذا علمت أن منسوب النقطة الخامسة = ٨,١٢ متر وأن الميزان نقل بعد القراءات الرابعة والسابعة والثانية عشر، وأن النقطة السادسة مأخوذة على كمرة الكوبري العلوي والقامة مقلوبة فالمطلوب: إيجاد مناسيب النقط المختلفة في جدول ميزانية كامل وعمل جميع التحقيقات الحسابية ثم أوجد مقدار القراءة (س) إذا علمت أن هذه القراءة فوق نقطة منسوبها = ٧,١٨ م **(١٠ درجات)**

السؤال الثالث (١٠ درجة)

يراد مد خط كهرباء ضغط عالي بين خمسة أبراج معدنية فإذا قيست المسافة الأفقية بين كل برجين متتاليين من خريطة بمقياس رسم ١: ٥٠٠ فكانت مساوية ١٨,٦ سم وكانت الأبراج بنفس الارتفاع وسطح الأرض يميل بمعدل ١: ٦ فإذا علمت أن الترخيم في منتصف المسافة بين كل برجين = ٧,٢ متر أوجد طول الكابل الحقيقي الذي يجب صرفه من المخازن. **(ملحوظة :يهمل الحد الثاني من معادلة الترخيم)**

مع تمنياتي بالتوفيق

د. حافظ عباس عفيفي

8.	For a rotating system with uniform air gap, electromechanical energy conversion is possible if: A) only stator winding is excited. B) only rotor winding is excited. C) both stator and rotor windings are excited. D) either stator or rotor winding is excited.
9.	For a rotating system with a cylindrical stator and salient rotor: A) only stator self inductance is a function of rotor position B) rotor self inductance is a function of rotor position C) both stator self inductance and mutual inductance are functions of rotor position D) all inductances (self and mutual) are functions of rotor position
10.	A rotating system with ac excitation for stator and dc excitation for the rotor is called a A) reluctance machine B) synchronous machine C) induction machine D) dc machine

The second question (10 marks)

Which of the following statements is correct? You can write down in your answer sheet the question number followed by either ✓ or X mark.

1.	To reduce leakage flux in a magnetic circuit, air gaps are to be increased
2.	For non-magnetic materials, the B-H relation is linear.
3.	Motional (speed) voltage increases with increasing supply frequency
4.	Mutual inductance between two coils depends on their self inductances
5.	For linear magnetic system stored energy equals co-energy.
6.	Direction of electromagnetic torque is to increase inductance
7.	Transformer voltage depends on coil inductance variation with position.
8.	The mutual inductance between two magnetically coupled coils *may be* lower than the smaller self inductance of each coils
9.	For doubly excited rotating system, it is necessary to have some saliency for possible electromechanical energy conversion.
10.	Distributed winding provides more sinusoidal mmf space variation

The third question (20 marks)

1.	Discuss what is meant by magnetic flux fringing in the magnetic circuits; then show how to minimize it. (4 marks)
2.	With the aid of BH curve of a permanent magnet material show the effect of air gap length on the position of the operation point (5 marks)

Please Turn Over

3. For two magnetically-coupled coils, show that the total stored energy W_t is given by:

$$W_t = \tfrac{1}{2} L_{11} I_1^2 + \tfrac{1}{2} L_{22} I_2^2 \pm M\, I_1 I_2$$

where I_1 and I_2 are the currents in the two coils.

L_{11} and L_{22} are the self-inductances of the two coils.

M is the mutual inductance between the two coils. (5 mark)

4. A magnetic circuit has three parts in series. The first part has a length of 10 cm and 2 cm^2 cross section area and made of a magnetic material of infinite permeability. The second part is an air gap of 2.5 cm^2 cross section area and 4 mm length. The third part is made of a permanent magnet material having the following BH curve data:

H (kAT/m)	-55	-50	-45	-40	-30	0
B (T)	0	0.35	0.8	1.0	1.1	1.25

It is required to establish a flux density of 0.8 T in the air gap. Determine the dimensions of the permanent magnet of minimum volume. (6 marks)

The fourth question (25 marks)

1. For a singly-excited rotating electromechanical energy converter, derive a relation for the developed torque in terms of both stored energy and co-energy. (5 mark)

2. With the aids of current-flux linkage curves, derive how to determine energy converted into mechanical motion from a certain position to another. (5 marks)

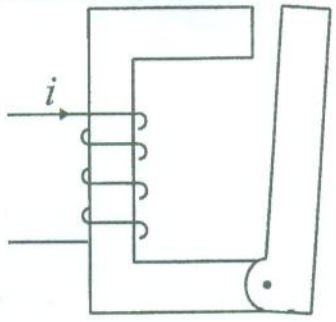
3. Sketch the space variation of self and mutual inductances for a doubly-excited electromechanical energy conversion device having saliency in both stator and rotor. (5 marks)

4. The electromagnet relay shown in figure has 1000 turns. The reluctance of the iron parts can be neglected.

a) If the air-gap length is 1 mm, what is the current required to develop a force of 30 Newton? (3 marks)

b) If the air-gap length is 2 mm, what is the current required to develop the same force of 30 Newton? (3 marks)

c) What is the energy stored in the air-gap volume for the conditions in part a and part b? (4 marks)



The fifth question (20 marks)

1. For a doubly-excited electromechanical energy conversion device of cylindrical stator and rotor:

a) Derive a general expression for the electromagnetic torque acting on the rotor. (8 marks)

b) Show all the possible electrical machines can be obtained. (4 marks)

2. Show the MMF space distribution a dc-excited coil of uniform air gap, if the conductors are
a) concentrated b) distributed in 8 slots (4 in each side).
Which of the two cases are preferred? Why ? (8 marks)

Good Luck and best wishes

Prof. Essam Eddin M. Rashad and Exam Committee

TANTA UNIVERSITY

Electrical Power and Machines Department

Faculty of Engineering

Final EXAM 2011/2012 - First Term

Course	Energy Conversion (EPM2106)	Time Allowed	3 hours
Students	2nd Year (Electrical Power and Machines)	Total Mark	90
Date	Sat. 16th January, 2012	Number of pages	3

Attempt ALL the following questions and problems:

- ***Clarify your answer with the suitable sketches as you can.***
- ***Assume any missed data reasonably.***

The first question (15 marks)

Choose the correct answer/answers for the following statements. It is sufficient to write down the question number followed by your choice/choices in your answer sheet:

1. Self inductance of a coil depends on
   A) Number of coil turns B) Core material
   C) Coil current D) All the above

2. Iron losses depend on
   A) electric supply frequency only B) flux level only
   C) area of hysteresis loop of the material only D) all the above choices

3. Compared with magnetic materials, permanent magnetic material has higher values of
   A) magnetic field intensity (H) B) flux density (B)
   C) relative permeability (μ_r) D) current

4. For dc excitation, induced emf is
   A) always zero B) only transformer voltage
   C) both speed and transformer voltages D) only speed voltage

5. Mutual inductance between two coils increases with increase of:
   A) angle between their axes B) distance between them
   C) their currents D) none of the above choices

6. For mutually coupled coils, if currents are both entering at the dot-marked terminals, coil fluxes
   A) are additive B) are subtractive
   C) increase D) cancel each other

7. For ideally coupled coils, coupling coefficient is
   A) zero. B) unity C) infinity D) between zero and unity

Please Turn Over

Problem number (4) (16 Marks)

(a) The conservation of heat can be used to develop a heat balance for a long thin rod. If the rod is not insulated along its length and the system is at steady state. The equation that results is :

$T'' + \eta(T_a - T) = 0 \quad , T(0) = T_1 \ \ and \ \ T(L) = T_2$

For L = 10 m rod with $T_a = 20$, $T(0) = 40$, $T(10) = 100$, $\eta = 0.01$ use finite difference method to solve this problem numerically by dividing the rod into five equal parts.

(b) Use the linear shooting method to get the solution of the BVP (by applying Euler's method).

$y'' = y - x\,y' + 2x + 2/x \quad y(1) = 0 \ , \ y(2) = 4\ln 2 \ , \quad h = 1/2$

Problem number (5) (16 Marks)

(a) Approximate the solution of the one-dimensional parabolic PDE

$U_{xx}(x,t) = U_t(x,t) \quad 0 \le x \le 1 \quad \text{and} \quad 0 \le t \le 0.15$, where

$U(0,t) = U(1,t) = 10 \quad \text{and} \quad 0 \le t \le 0.15$

$U(x,0) = 10 + 10x(x-1) \qquad 0 \le x \le 1$, use $h = 0.25$, $k = 0.05$

(b) Determine the vertical displacement $U(x, t)$ of a uniform perfectly flexible string of a constant density that is lightly stretched between two fixed points 0, L. Consider the wave equation given by

$U_{xx}(x,t) = U_{tt}(x,t) \ , \ 0 \le x \le 2 \ , \ 0 \le t \le 1$

subject to $U(0,t) = U(2,t) = 0, \quad U_t(x,0) = 0$

$U(x,0) = 16x^2(2-x)^2 \qquad 0 \le x \le 2 \qquad \text{with} \quad h = 0.5 \ , \ k = 0.25$

Good luck

Dr. Manal Mohamed Hekal

Dr. Waheed Kamal Zahra

Course Title: Engineering Mathematics (3) a Year: 2nd Electrical Power and Machines Engineering.
Course Code: PME2109 Date: 20 / 1 / 2012 (First term) Allowed time: 3 hrs No. of Pages: (2)

Remarks: (Answer the following questions. Assume any missing data…)

Problem number (1) (19 Marks)

(a) Consider $f(x) = 2x^2 e^x + 1$, $x = 1, 1.5, 2.5$. Determine the coefficients of Lagrange interpolation to evaluate approximate value of $f(2)$.

(b) Determine the polynomial of degree ≤ 4 using Newton's divided differences that interpolate the data in the following table:

x	1.0	2.0	3.0	5.0	7.0
$f(x)$	14.5	19.5	29	87.5	161

(c) In a biology study, the growth of a bacteria culture recorded the following data:

t	2.0	5.0	8.0
$b(t)$	5.0	9.0	18.0

Where $b(t)$ denotes the number of bacteria at time t (hours). Use natural cubic spline to estimate the number of bacteria at $t = 4$ and $t = 6$.

Problem number (2) (18 Marks)

(a) Let $f(x) = x\cos x - 3x^2$. Approximate $f'(1.2)$, $f''(1.2)$ using h = 0.1 with errors of the order h^4 and h^2 respectively.

(b) By applying Richardson extrapolation technique, we can reduce the truncation error to approximate the first derivative of a function. Derive Richardson formula and the bound of error that is of order h^4.

(c) Determine the number of subintervals n required to approximate the integral $\int_0^2 (\cos x + x^4)\,dx$, with an error E_T less than 10^{-4} using the Simpson's composite rule.

Problem number (3) (16 Marks)

(a) Euler's method is the simplest method of all the numerical techniques for solving IVPs. Derive formulas for local and global truncation errors of this method.

(b) Use the Adams third–order predictor–corrector method to obtain an approximation to the solution of the IVP: $y' = y x^{-2}$, $x \in [1, 2]$, $y(1) = 2$ *with* $h = 0.25$. Obtain the starting values using second-order Runge-Kutta method.

P.T.O.

Q3: **(20 Marks)**

A. Find and plot the electric field intensity and potential everywhere due to a point charge Q which located at the center of a spherical conducting shell of radii a and b. **(5 Marks)**

B. The plane z = 0 is a perfectly conducting surface. A point charge of 5 nC is located at A(2, -3, 6), and a point charge of – 8 nC is located at B(4, 3, 1).

i- Determine V at a point midway between the two charges.

ii- Find y if V=0 at C (5, y, 1). **(8 Marks)**

C. Evaluate the force produced on a square loop connecting points A(1,0,0), B(3,0,0), C(3,2,0) and D(1, 2, 0) which carries a current of 2 mA in counterclockwise direction due to a current carrying conductor of 15 A in the y-axis. **(7 Marks)**

Q4: **(25 Marks)**

A. Drive an expression for the magnetic field strength due to an infinite line carries current I directed in positive z-axis direction. **(7 Marks)**

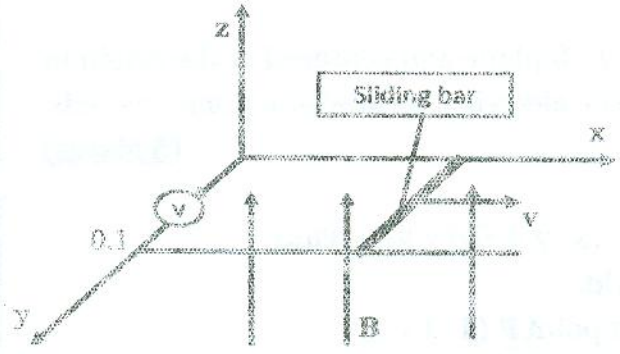
B. Evaluate the magnetic field strength at the point P(2, 2, 0) at the center of square loop of 2 meter length located at z = 0 plane and carries current 5 A in counterclockwise direction as shown in the figure. **(8 Marks)**

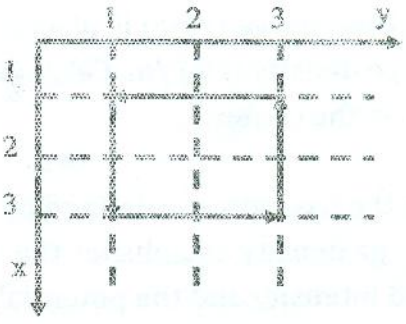
C. Let a magnetic flux density $B = (0.5\,x)\,a_z$ Tesla as in the figure. The position of the sliding bar is given by $x = 4t - 2t^2$ meter. If the separation of the rails is 10 cm.

i- Calculate the voltmeter reading at t =0.5 second

ii- Calculate the voltmeter reading when x=1 meter

iii- Plot the voltmeter reading for $0 < t < 3$ second **(10 Marks)**





WISH YOU ALL THE BEST Dr. Ayman Hoballah

انتهت الأسئلة

TANTA UNIVERSITY
Faculty of ENGINEERING
DEPARTMENT OF ELECTRICAL POWER AND MACHINES ENGINEERING
EXAMINATION (SECOND YEAR) STUDENTS OF ELECTRICAL ENGINEERING

COURSE TITLE: ELECTROMAGNETIC FIELDS			COURSE CODE: EPM2104/EPM2142
DATE: 09/01/2012	TERM: FIRST	TOTAL ASSESSMENT MARKS: 85	TIME ALLOWED: 3 HOURS

Notes:
Systematic arrangement of calculations and clear neat drawings are essential.
Any data not given is to be assumed – Answer as many questions as you can.
Answer as brief as possible

الإمتحان مكون من 4 اسئلة في ورقتين

Q1: **(20 Marks)**

A. Using Gauss's law, derive an expression for the electric field intensity **E** at a point P a radial distance *a* meter from a uniformly charged infinite line by ρ_l C/m. **(5 Marks)**

B. Let a point charge Q1 = 25 nC be located at point P_1 (4, -2, 7) and a charge Q_2 = 60 nC at P_2 (-3, 4, -2) in free space.
   i. Find **E** at P_3 (1, 2, 3).
   ii. Specify at what point on the y-axis is E_x =0.
   iii. Determine the location of a point charge Q_3 = -30 nC to cancel the field at the origin.
   iv. How much electric flux leaves the surface of a sphere of radius 10 m centered at the origin?
   (10 Marks)

C. A volume charge is distributed throughout a sphere of radius *a* meter and centered at the origin with uniform density ρ C/m³. Evaluate the electric field and total energy stored due to this charge distribution. **(5 Marks)**

Q2: **(20 Marks)**

A. Find the work done in moving a 5 μC charge from the P1(1,8 ,5)to P(2, 18 , 6) through electric field $\mathbf{E} = (-8xy)\bar{a}_x - (4x^2)\bar{a}_y + \bar{a}_z\ V/m$ along the path: $y = 3x^2 + z,\ z = x + 4$ **(5 Marks)**

B. Consider a circular line charge (ring) is placed in z=0 plane and centered at the origin in which the line charge density is k c/m. Calculate the electric potential at a point at z-axis away distance *h* from the center. **(5 Marks)**

C. A potential field in the free space is defined by $V = x^2 y + 5y^2 z$ Volt. Find: -
   i- The volume charge density establishes this field.
   ii- The electric field intensity and the potential at point P (1, 3, 2).
   iii- The potential difference between A (1, 2, 3) and B (2, 3, 1).
   iv- The total charge inside cube defined by $0 < x, y, z < 3$. **(10 Marks)**

Question (4) **(18 Marks)**

a) Derive an expression for the sag in transmission lines between supports at the same level. (6 Marks)

b) An overhead line with copper conductors is supported on two towers 200 m apart having a difference in level of 10 m. The conductor diameter is 2 cm and weighs 2.3 kg/m. Calculate the sag at the lower support under the conditions if wind provides a pressure of 57.5/m^2 of the projected area and a factor of safety is 4. The maximum tensile strength of copper is 4220 kg/cm^2. (12 Marks)

Question (5) **(18 Marks)**

a) Compare between the weight of copper used in 3-wire and 2-wire DC distribution system. (6 Marks)

b) A distributor AB of 600 m is fed from both the ends at 250 V and is loaded with loads of 100 A, 50 A and 80 A at distances of 200, 300 and 500 m respectively from the feeding end A. If the maximum allowed voltage drop is 5 V, find the resistance in ohm/m of the conductor. (12 Marks)

With my Best Wishes

Dr. Doaa Mokhtar
and **Examination Committee**

Tanta University

Department: Elec. Power and Machines Engineering
Total Marks: 90 Marks

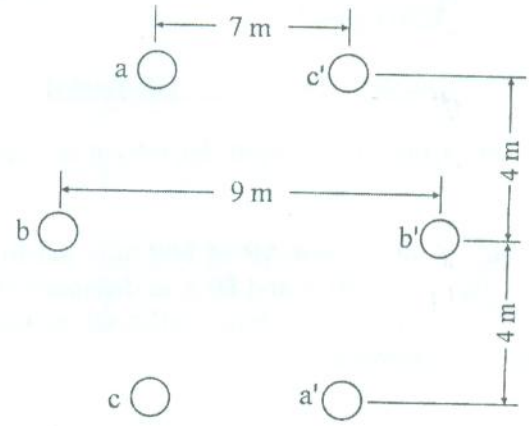
Faculty of Engineering

Course Title: Electrical Power Engineering (1) | Course Code: EPM2105 | Year: Second year
Date: Jan 23rd 2012 (First term) | Allowed time: 3 hrs | No. of Pages: (2)

Answer all the following questions:

Question (1) **(12 Marks)**

The six conductors of a double circuit transmission line are arranged as shown in the figure. The diameter of each conductor is 2.5 cm. Find the capacitive reactance to neutral and the charging current per Km per phase at 132 kV and 50 Hz, assuming that the line is regularly transposed.



Question (2) **(24 Marks)**

a) Explain using phasor diagram the Ferranti effect. (4 Marks)

b) Derive an expression for A, B, C, D constants for two networks in series having constants A_1, B_1, C_1, D_1 and A_2, B_2, C_2, D_2. (4 Marks)

c) A 3-phase transmission line of length 150 km delivers a load of 50 MW at 110 kV and 0.8 lagging power factor. The line has a resistance, inductive reactance and capacitive shunt admittance of 0.1 Ω/phase/km, 0.5 Ω/phase/km and 3×10^{-6} mho/phase/km, respectively. Using nominal-T method, determine: (16 Marks)

1. The efficiency.
2. The regulation of the line.
3. The charging current.

Question (3) **(18 Marks)**

a) Mention the different types of insulators used in transmission lines. (4 Marks)

b) What is the reason of unequal voltage distribution over suspension insulators? Mention three methods to improve this voltage distribution. (5 Marks)

c) The self capacitance of each unit in a string of three suspension insulators is C. The shunting capacitance of each insulator to earth is 0.15 C while the capacitance between the pin and the guard ring is 0.1 C. Calculate:

i. The voltage across each insulator as a percentage of the line voltage to earth.
ii. String efficiency.

(9 Marks)

P.T.O.

وكان الميزان قد نقل بعد **القراءات الرابعة والسادسة والعاشرة والرابعة عشر**. عين في جدول ميزانية مناسيب النقط مع عمل كل التحقيقات اللازمة إذا كان **منسوب النقطة الخامسة هو متران تحت سطح البحر**. وإذا أريد تسوية هذا القطاع بحيث **يميل ٠,٥% إلي أسفل مع ثبات منسوب النقطة الرابعة في** الميزانية فعين في نفس الجدول **ارتفاع الحفر والردم** إذا كانت نقط القطاع تتباعد **٤٠ متر** بعضها البعض. **(١٢ درجة)**

السـؤال الرابع - (٦ درجات)

وضح بالرسومات المتقنة وكافة البيانات على الرسم كلا مما ياتي:

أ- كيفية انتقال الأحمال من المنشآت الى التربة.
ب-التوزيع المثلثى لكل من : التربة الجافة – التربة المشبعة جزئيا– التربة المشبعة كليا.
ت-شكل توزيع الاجهادات الرأسية داخل التربة الناتجة عن كلا من وزن التربة والأحمال الخارجية وذلك خلال مستوى رأسى يمر بمنتصف الأساس.
ث-بعض الأسباب التى تؤدى لحدوث ظاهرة الهبوط النسبى فى المنشآت.

السـؤال الخامس:- (١٠ درجات)

أ- ماهى التربة، وكيف تكونت؟
ب-ماهى أهم الفروق بين التربة المتماسكة والتربة الغير متماسكة؟
ت-أذكر أمثلة على بعض أنواع التربة ذات المشاكل موضحا الأضرار التى تسببها للمنشآت.
ث-كيف يمكن تصنيف التربة طبقا لقطر حبيباتها؟
ج- وضح لماذا يعتبر الهبوط النسبى أكثر خطورة على المنشأ من الهبوط الكلى، وما هى قيم كلا من الهبوط الكلى والهبوط النسبى المسموح بها للأساسات طبقا للكود المصرى لتصميم الاساسات.

السـؤال السادس:- (٩ درجات)

أ- ما المقصود بفقاعة الضغط داخل التربة، وكيف يمكن أن يؤثر أبعاد الأساس على حجمها.
ب-أذكر مع التوضيح بالرسم الأنواع المختلفة للأساسات السطحية.
ت-متى يتم اللجوء لاستخدام الأساسات العميقة بدلا من الأساسات السطحية؟
ث- أذكر أنواع الخوازيق المستخدمة فى الأساسات العميقة وذلك تبعا لطريقة تنفيذها.
ج- المطلوب حساب قيمة الاجهادات الكلية المتولدة فى كابل كهربائى نتيجة لحمل موزع مقداره ٨.٠ طن/م^2 يؤثر بمنتصف قاعدة أبعادها ١.٠ x ١.٠ متر تقع على سطح الأرض، اذا علمت أن السطح العلوى للكابل يقع على عمق ٢ متر أسفل الأساس وأن وزن وحدة الحجوم للتربة الموجود بها الكابل هو ١.٩ طن / م^3

ملحوظة: استخدم الطريقة التقريبية لحساب الاجهادات الناتجة عن الحمل المركز.

With the best of wishes.....

examiners: Dr. Ahmed Farouk, Dr. Sobhy A. Younes

2/2

Tanta University	Department: Electrical Engineering Total Marks: 70 Marks	Faculty of Engineering
Course title: Civil Engineering	Course code: 21H3	Second Year : First term
Date: January 23, 2012	Allowed time: 3 hours	No. of pages : (2)

السؤال الأول (١٥ درجة):

أ. أذكر بالتفصيل الخطوات العملية اللازمة لقياس طول خط أ ب بالطرق المختلفة إذا علمت أنه:

- **يمكن رؤية** كل من نهايتي الخط أ ب من الأخرى ويصعب التوجيه بسبب وجود بحيرة بينهما.
- **لا يمكن رؤية** أي من نهاية الخط أ ب من الأخرى بسبب وجود عائق (مبني مرتفع) بينهما يعوق الرؤية والتوجيه معا.
- نقطة أ تقع علي الجانب الأيمن لترعة القاصد ويمكن أن يحتلها الراصد أما نقطة ب فتقع علي الجانب الأخر من الترعة ولا يمكن الوصول إليها. (٦ درجات)

ب. حول المقاييس الآتية إلي مقاييس عددية:

١٦/١ من البوصة للميل – ٢,٥ بوصة لكل ٥ كيلو متر –
٢.٥ سم لكل ٢٠ ميل – ١٢,٥ مم لكل ٢٥٠٠ ذراع . (٣ درجات)

ت. المطلوب تصميم ورسم مقياس رسم تخطيطي ١ : ٢٠٠ يقرأ مباشرة إلي أقرب ٠,١ **من القصبة** ثم استعمل المقياس لرسم قطعة أرض رباعية الشكل حيث **أ ب = ٨,٣ قصبة ، ب حـ = ٥,٤ قصبة ، حـ د = ٧,٧ قصبة ، د أ = ٥,٧ قصبة ، د ب = ٨,٢ قصبة ،**
ثم استنتج طول القطر أ حـ. (٦ درجات)

السؤال الثاني (١٥ درجة):

أ- اشرح بإيجاز خطوات الرفع المساحي باستخدام الشريط مع شرح طريقتين للتحشية موضحا إجابتك بالرسم. (٣ درجات)

ب- قيس خط بين نقطتين علي مستوي انحداره ١ : ٥ فوجد أن طوله ١٠٩,٢٥ متر. وبعد إتمام القياس أختبر الشريط فوجد أن طوله **ينقص بمقدار** ١١ سم عن طوله الاسمي وهو ٢٠ **متر فما هو الطول الذي يعين به هذا الخط علي خريطة مرسومة بمقياس ١ : ٥٠٠ .** (٦ درجات)

ت- منطقة مائية في الميناء مربعة الشكل ومحاطة علي أضلاعها بأسلاك يتدلي منها ألغام وكان طول كل سلك **نصف كيلو متر** ونتيجة لثقل الألغام حدث ترخيم في السلك بلغ مداه في المنتصف من كل سلك قدره ٢٠ مترا. ما هي **مساحة قطعة الأرض بالمتر المربع وبالفدان وما هو الخطأ النسبي في حساب المساحة؟** (٦ درجات)

السؤال الثالث (١٥ درجة):

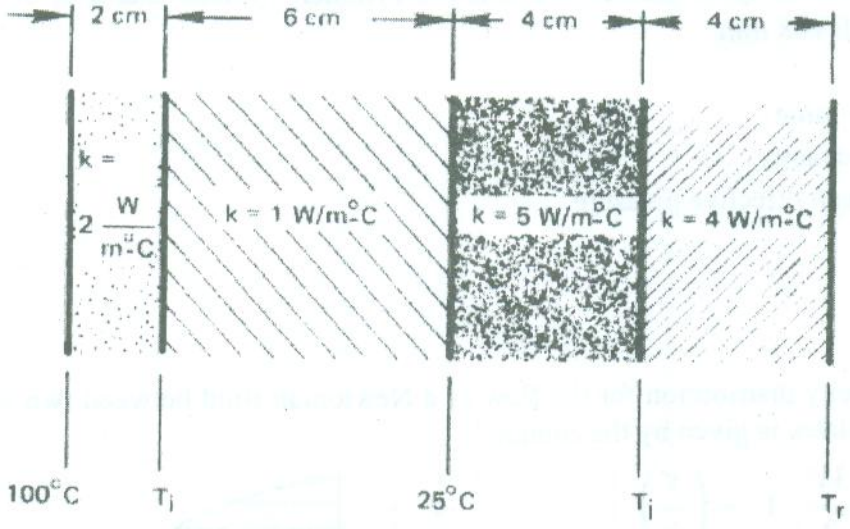
أ- اشرح الخطوات العملية اللازمة لإيجاد **الزاوية المحصورة بين ضلعي مبني مقام** إذا علمت أن إمكانية **القياس من الخارج** فقط وباستخدام القياسات الطولية. (٣ درجات)

ب- عند إجراء ميزانية طولية علي قطاع طولي كانت قراءات القامة:

٣,١١ – ٢,٥٨ – ١,٩٧ – ٢,٠٨ – ٢,٨٥ – ١,٥٩ – ١,١٢ – ٢,٩٥ – ٠,٨٤ – صفر – صفر –
١,١٨ – ١,٢٤ – ٠,٤٤ – ٠,٢٣ – ١,١٣ – ١,٨٧

and delivery pipe is 20 cm and length of suction pipe 5.5 m and length of delivery pipe is 20 m. the friction factor of pipe material 0.04 m. Determine the shaft power input to the pump. Given pump efficiency 0.86.

5-What are Ti, Tj, and Tr in the wall shown in the following Figure



6-Determine the value of maximum temperature and its position of the wall with the uniform distributed heat source having volumetric rate of heat generation $q_v = 8*10^6$ w/m^3, the plate thickness 10 mm and thermal conductivity of the plate material K=20 w/m.°c, the surface temperature of the plate are $T_{w1} = 80°C$, $T_{w2} = 80\ °C$

With my best wishes

Tanta university
Faculty of Engineering **Engineering Mechanics**
Elect. Power Depart. **Time allowed: 3 hr**

Final Exam 2011-2012

1- Autombile engine that operates on four-stroke engine produced brake power 94 kw at speed 2000 rpm, number of cylinder 6 cylinder, cylinder diameter 80 mm, stroke length 108 mm.

Calculate:

a- Stroke volume

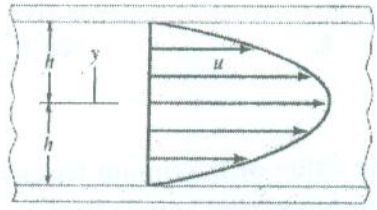
b- Engine capacity

c- Brake mean effective pressure

d- Torque.

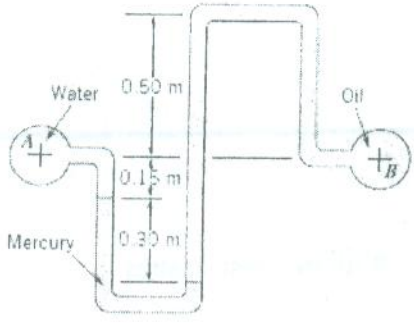
2- The velocity distribution for the flow of a Newtonian fluid between two wide, parallel plates is given by the equation

$$u = \frac{3V}{2}\left[1 - \left(\frac{y}{h}\right)^2\right]$$



Where V is the mean velocity. The fluid has a viscosity of 0.04 pa. s. When V= 2 m/s and h = 0.1 m determine: (a) the shearing stress acting on the bottom wall, and (b) the shearing stress acting on a plane parallel to the walls and passing through the centerline (midplane).

3- The mercury manometer of Fig. indicates a differential reading of 0.30 m when the pressure in pipe A is 30-mm Hg vacuum. Determine the pressure in pipe B.



4- A centrifugal pump deliver 0.2 m^3/s discharge of the water from suction reservoir in to delivery reservoir. The static suction head 5 m blow the atmospheric pressure and static delivery head 18 m above the atmospheric pressure. Diameter of suction